THE IRON TRADE REVIEW

VOLUME XXIX. CLEVELAND, O. FEBRUARY 6, 1890. CHICAGO, ILL. NUMBER 6.

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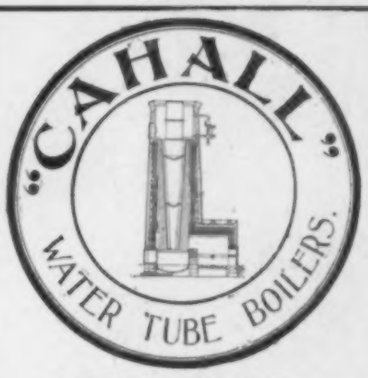

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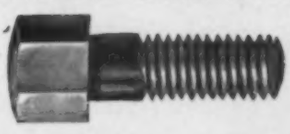

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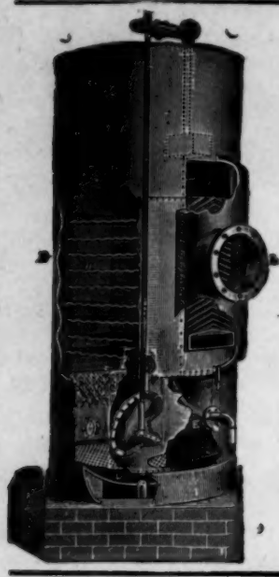

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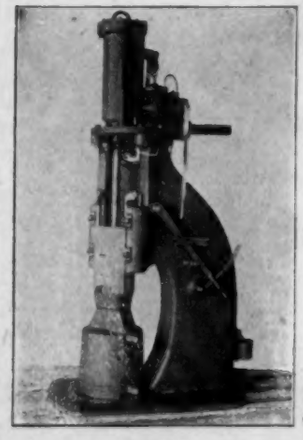

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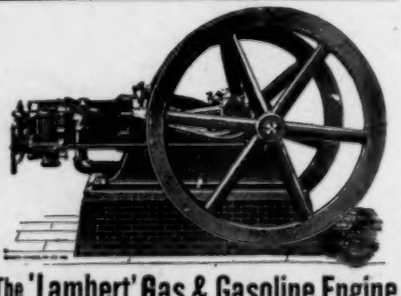

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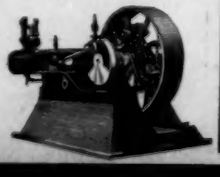

THE IRON TRADE REVIEW

VOLUME XXIX. CLEVELAND, O. FEBRUARY 6, 1896. CHICAGO, ILL. NUMBER 6.

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

The advances in Bessemer pig and steel billets, after demonstrating how little buying is needed, under present conditions, to start an upward movement, have been followed by a lull, with lower prices. The past week has been in most markets one of inactivity, and inquiries, as well as sales, have fallen off. Much of the inquiry of the few preceding weeks appears to have been by way of sounding the market; at all events only a part of it has resulted in business. Yet it appears that buyers are not skeptical, as most of them were in the early part of 1895, as to the ultimate effect of the higher prices for raw materials which has been so often referred to in the market reviews of the past six weeks. It is not so much an expectation of lower prices that deters the large majority of those who wait, as a desire to be better assured about the prospects for their own business and for business in general. The iron market has borne its full share of the embargo laid on trading by withdrawing from commercial lines several times the $100,000,000 involved in the bond sale. The effect of the tariff uncertainty of two years ago has been repeated on a small scale. There is good reason for the belief that as the completion of the bond transaction only awaits the formality of an announcement of successful bidders, the re-availability of $400,000,000 to $500,000,000 for the needs of ordinary business will be felt at once in freer trading in all lines. In pig iron the largest buying of the week was by pipe interests, one Southern concern taking close upon 20,000 tons. The total purchases by pipe foundries since the opening of the year have reached a very respectable aggregate. Rolling mills, however, have scarcely been felt as buyers of forge iron, though their requirements of old material have been gradually increasing. The decline in Bessemer pig is about 50 cents a ton. Further deliveries on certain iron sold to middlemen are maturing and to place this iron a price of $12 in the valley has been made, and some Pittsburg business has been at $12.65. Furnacemen, however, seem to adhere to the $13 valley quotation. Steel mills in the valley, Pittsburg and Wheeling districts are making an output in excess of demand and are quoting lower prices. In the Wheeling district $17.50@$17.75 is the range of late sales and $17.50 has been shaded in the valley. Wire and wire nail demand are improving, however, and in the Cleveland district some billet purchases are pending. Would-be buyers of finished material have found a more general adherance to quotations among the mills. The light buying of the week has not depressed prices, apparently. Plates are firm, and 1.35c., Pittsburg, for tank steel is regarded as minimum. In the East there has been some business at 1.40c., Philadelphia, a relatively lower basis than that in the West. The idleness of an important Western plate mill through an accident may last through the month. The railroads are expected to give some sign as to 1896 in the present month, now that the financial stress is somewhat relieved. Western mills have large expectations for the year, particularly as to rail tonnage. News of the associations this week is confined to the advance in wire nails from $2.25 to $2.40, carload lots, Pittsburg, and to the adjournment of the second Cleveland meeting of bar iron men. While there are some mills that are still outside the association, the Cleveland meeting has resulted in a much firmer basis of organization.

THE CLEVELAND DISTRICT.

Barring occasional deals, in which furnacemen having a surplus of ore have arranged for re-sales of small lots, there is nothing doing in the ore market. Such transactions continue to be at about $1 above the price of last spring. No expectation is found that prices on 1896 ore will be named for some weeks—not until March in any event. Discussion of vessel charters is also in abeyance, though it is intimated that the changed conditions in the market since the $1.10 charters were made from the head of Lake Superior would make $1 a corresponding basis to-day. A matter of interest to iron ore selling firms and furnacemen is the bill recently introduced in the Ohio Legislature providing that sales agents or consignees of ores held in Ohio, whether mined in the State or not, and destined for points within or without the State, shall list such ores for taxation. The bill would put an additional burden on the ore trade and on furnacemen, who in the end will have to pay the tax in increased cost. At the rate of taxation in some Ohio counties, the amount would be from 5 to 10 cents on every ton of ore. Aside from any constitutional question involved, and aside from the injustice of singling out iron ore in transit, rather than grain, lumber, coal or other products which come to lower lake ports, it ought to be sufficient to ensure the defeat of this bill to say that its result, if enacted, would be to drive the iron ore business to New York and Pennsylvania docks. Ohio has already done quite enough in the direction of taxing productive wealth out of the State, and we cannot believe that the bill proposed has any serious chances of passing. The iron ore trade of the south shore docks of Lake Erie is certainly too valuable to be driven by such ill-advised measures to the docks of neighboring States.

Pig Iron. There has been little activity in either the Cleveland or Valley districts the past week. Bessemer iron is weaker and while most furnaces are firm at $13 in the Valley, we hear of a furnace quotation of $13.25 delivered in Cleveland. The small amount of iron sold the past week at $12 in the valley, or at a comparatively lower price, Pittsburg, is said to be from second hands. One or two inquiries from brokers for round lots have been made in the week but there is little actual selling. Foundry iron is unchanged, with quotations $12.50 and $13 respectively for Nos. 2 and 1 all ore strong iron, valley furnaces, and $12 and $12.50 for No. 2 and No. 1 Scotch irons. Cinder mixed irons have sold at $12 for No. 2. Cleveland foundries are only fairly busy and the daily melt of iron is but little greater than a year ago. Prices of castings, with higher iron, higher coke, and higher labor, are in some cases below those of a year ago. Forge iron and Lake Superior charcoal are neglected. We quote the former at $11 in the valley and the latter at $14.25@$15, Lake Erie port.

Continued on page 7.

THE CHICAGO DISTRICT.

[SPECIALLY REPORTED FOR THE IRON TRADE REVIEW.]

An active market is reported by the majority of dealers in iron and steel, with a firmer tone to quotations. Buyers appear to have made up their minds that present prices are as low as they will be for some time and have been more willing to place orders in the past week. No especially large contracts for any class of material were made, but the aggregate of sales in comparatively small lots brought the total tonnage up to a very respectable amount. Mills and furnaces are disinclined to make sales for very long deliveries at the present quotations and almost all the week's business is for delivery within the next two or three months. Quotations are firm on nearly all classes of material, although they have been reduced from 50 to 75c a ton on Northern pig iron. The local furnaces report that this reduction has been made in order to meet the low prices made in Southern iron and to keep the pig iron business in this territory in the hands of the local producers to the same extent as heretofore.

PIG IRON.—Prices have been changed quite a good deal in the past week. Quotations on Northern irons having been reduced about 75c a ton and those on Southern are being made at more nearly the quotations agreed upon by the Southern furnaces some time ago. This leaves a difference of from 25c to 50c a ton between Northern and Southern irons and will undoubtedly result in the Northern furnaces getting a larger share of the business than they have been receiving in the past few weeks. The sale of Southern iron was not so large last week as the week before but among the orders closed were several ranging from 1,000 tons down. There is still a large inquiry for Southern iron and it is expected that business will continue good for the next few weeks at least. In local iron the sales of the past week show a considerable increase owing to a large extent to the reduced prices made by the furnaces. Several sales of 1,000 tons each were made and from that down to carloads. Lake Superior charcoal iron has been in good demand and several thousand tons were sold last week. The following quotations represent as nearly as possible the actual condition of the market at present:

Lake Sup. Charcoal.....	$14 00@14 50	Southern No. 2 Soft.....	$12 10@12 35
Local Coke Fdy. No. 1...	12 75@13 25	South'n Silveries No. 1.	13 35
Local Coke Fdy. No. 2...	12 25@12 75	South'n Silveries No. 2.	12.85
Local Coke Fdy. No. 3...	11 75@12 25	Jackson Co. Silveries...	14 50@16 00
Local Scotch Fdy. No. 1.	12 75@13 25	Ohio Silveries No. 1	15 00@15 50
Local Scotch Fdy. No. 2.	12 25@12 75	Ohio Silveries No. 2.....	14 50@15 00
Local Scotch Fdy. No. 3.	11 75@12 25	Ohio Strong Softeners...	15 00@15 50
South'n Coke No. 1.....	12 60@12 85	Alabama Car Wheel.....	17 50@18 00
South'n Coke No. 2.....	12 35@12 60	Malleable Bessemer.....	.....
South'n Coke No. 3.....	12 10@12 35	Coke Bessemer	.....
Southern No. 1 Soft.....	12 60@12 85		

BARS.—A quite active market has been the rule and several orders for round lots of both iron and steel were placed by implement manufacturers and car builders. Prices are made by the Association mills at 1.30c for common iron and 1.40c for guaranteed, but it is currently reported that this price has been cut to quite an extent both by mills in the Association and those which are not. It is impossible to obtain any definite particulars regarding sales, either from buyers or sellers, but a sale of 500 tons of iron at 1.17c is reported to have been made within the last two weeks. The Association mills, however, all claim to be maintaining strictly the Association prices and that buyers are willing to pay these prices. Soft steel bars from billet stock are quoted at 1.42½c to 1.45c.

RAILS AND TRACK SUPPLIES.—Orders for lots of from 1,000 to 3,000 tons continue to come in to the local steel company, but so far no large contracts have been closed with any of the Western roads. The outlook continues excellent and the officials of the local company expect a large business for this year. Quotations are unchanged as follows: Rails, $29 and up; splice bars, 1.65c to 1.75c; track bolts, 2.25c to 2.45c; spikes, 1.85c to 1.90c.

BILLETS AND RODS.—No very large sales of billets were made last week and the quotation is continued at $19.50 to $20. Rods are quiet with little demand and only a few small sales.

STRUCTURAL MATERIAL.—General business in small lots continues to grow better every week and the outlook is for a much better business in this class of work than was had last year. No large contracts were placed last week, but several that have been in the market for some time will probably be placed within a short time. Prices are made as follows: Beams and channels, 1.70c to 1.75c; angles, 1.50c to 1.55c; plates, 1.60c to 1.65c; tees, 1.70c to 1.75c. Small lots from stock are quoted ¼c to ½c higher.

PLATES.—A large inquiry is being received all the time, and the local mills report orders plentiful and buyers ready to pay the asked prices. The mills at South Chicago are full of orders for the balance of this month. Quotations are made as follows: Tank steel, 1.60c to 1.65c; flange steel, 1.85c to 1.90c; fire-box steel, 2.85c to 5c; boiler tubes, 60 to 65 per cent discount.

MERCHANT STEEL.—Buyers are still apparently desirous of filling their requirements for as long a time as possible, and have been making heavy purchases in the week. The mills are not as anxious to take orders for long deliveries as buyers are to make them, and consequently the market is very firm. Prices are maintained as follows: Open-hearth spring, tire and machinery steel, 2c to 2.10c; smooth finished machinery steel, 1.75c to 1.80c; smooth finished tire 1.65c to 1.70c; tool steel, 5.50c to 7.50c; specials, 11c and upwards; Bessemer bars, 1.55c to 1.65c.

SHEETS.—The situation shows steady improvement. Mills which have been cutting prices until recently are gradually getting into line, and as a consequence the market is much firmer. Large sales of both galvanized and black sheet iron are reported, and an excellent outlook for the future. No. 27 black is quoted at 2.40c to 2.45c, and galvanized at from 75 and 10 per cent to 80 per cent discount.

OLD RAILS AND WHEELS.—This class of old material is in fair demand, although no large sales were made last week. Old wheels are quoted anywhere from $13.50 to $15; old iron rails, $14.50 to $15; old steel rails, $11.50 to $12.

SCRAP.—The demand is considerably larger, and dealers report a much better feeling among buyers, although no large sales have as yet been made. The following are buying quotations furnished by dealers: Railroad forge, $10.50 to $11; dealer's forge, $10; No. 1 mill, $6.50 to $7; railroad cast, gross ton, $9.50 to $10; machinery cast, $10 to $11; axles, $13.50; cast borings, $5; wrought turnings, $6; axle turnings, $7; mixed steel, $8; stove plates, $5.50 to $6; heavy melting steel, $9 to $9.50.

IN OTHER MARKETS.

[SPECIALLY REPORTED FOR THE IRON TRADE REVIEW.]

Pittsburg. A slight reaction from the firmness gathered in Bessemer pig and steel billets, in the preceding three weeks; has been noted in the week under review. While there appears to be no change in the attitude of the majority of valley furnaces, in holding to $13 as a minimum for Bessemer, there seem still to be a few holders who are compelled to realize, and conse-

quently a few sales have been made at $12 in the valley, with some business at $12.50, Pittsburg. Very little has been done, however. There is no expressed expectation that there will be any further decline, and buyers are not waiting for lower prices. The consumers of Bessemer are supplied for the immediate future and there is scarcely enough weak iron to cut a figure in the market. We note a sale of 1,000 tons and one of 2,000 tons, at $12.65 Pittsburg. The inability of some of the steel mills to place their product makes an uncertain outlook both in Bessemer and billets. The main support to prices is the continuance of the $2 price on coke and the general acceptance of the iron ore agreement as a fact. Some concessions have been made in the week by steel mills and billets are now quoted at $17.50 to $17.75 Wheeling, with indications of lower prices in the valley. A sale of 2,000 tons at $17.40 valley mill is reported and one at $17.50 Wheeling, February and March deliveries. On contracts extending into April and May a slight advance on these figures is secured. Forge iron is in fair demand and $11 to $11.25 is the quotation. A sale of 1,000 tons is reported at $11 Pittsburg. Foundries are running only moderately full. The indications are not especially encouraging and foundry irons are bought in a small-lot way. We continue to quote $13.25@$13.50 for No. 1 and $12.75@$13 for No. 2. Reports regarding finished material vary according to the order books of the mills. Some have closed a considerable tonnage in the past few weeks and are disposed to hold firmly to quotations, notwithstanding that the week has shown something of a lull in buying. Structural material continues to give promise of a good spring demand. Beams and channels up to 15 inches are still quoted at 1.50c., though this figure has been shaded in competitive districts. Reports of building projects in several cities are promising. On angles we quote 1.25c.@1.30c.; tees, 1.40c.@1,45c.; universal plates, 1.35c. There is a firmer feeling as to plates and mills are holding quite stiffly to 1.35c. for tank steel. The week has shown no important business in this line. Sheets are more active. On common iron we quote 2.35c. for No. 27 and 2.45c. for No. 28. Galvanized show a shortening of discounts and 75, 10 and 5 to 75 and 10 is the range. Sheet bars are quiet. A sale of 250 tons is reported at $19.25. The demand for wrought pipe is improved though no great activity is expected before spring. Base quotations are: Lap weld black, 65 per cent; lap weld galvanized, 52½ per cent; butt weld black, 55 per cent; butt weld galvanized, 50 per cent. From these four 10s additional are made on round lots. Boiler tubes 2¼ and smaller, 70 and 10 per cent; boiler tubes 2½ and larger, 65 and 10. Sklep iron is lower. A sale of 1,000 tons of grooved iron skelp is reported at 1.17½c. Grooved steel is 1.05c.@1.10c.

Cincinnati. The business of the week under review has been large in tonnage, and the orders have come from every kind of industry in which pig iron is used. Whether the increased buying is a "spurt" or the presage of a healthy and gradual development of business, remains to be seen. There is an entire absence of speculative buying, the traffic being confined to legitimate lines of trade. Sales are being made for somewhat extended deliveries to accommodate the manufacturers who desire to cover their contracts as far as practicable. The car works and iron rolling mills are not so active, but fresh buying by these branches must come sooner or later, as the railroads have been improving steadily in their earnings and soon will be able to improve their impaired equipment, which will augment the current business in a very marked degree. There are now some indications of a firmer market.

Philadelphia. The buying movement has become general and a healthy condition prevails. The mills in the Susquehanna district have all resumed operation and have laid in about three months' supply of raw material. Here and there we hear of furnaces that have sold their output for three months ahead.

Buffalo. During the past week there has been more interest shown in the local pig iron market in purchases for future wants. While the inquiries do not all result in orders being placed, yet it shows that much more thought is now being given the subject, and the orders which have recently been entered have encouraged local furnaces to feel that they can at least hold their own. We believe the market in this neighborhood to be more active, and if the much talked of bonds are easily placed, it will result in more work for foundries.

Personal.

W. C. Temple responded to "Vacuum;" Wm. Metcalf to "Momentum and Inertia;" H. J. Lewis to "Friction," and Julian Kennedy to "Head," at the annual banquet of the Engineers' Society of Western Pennsylvania, at Pittsburg, Thursday evening, Jan. 30. The specifications of the menu were prepared in engineering phrase, and the inference is that very little material was rejected.

The exodus from Cleveland the past week of a number of members of iron ore selling firms may be taken to indicate both the adjustment of all unsettled questions relating to the distribution of the Bessemer output for 1896, and the practical certainty that it will be several weeks before prices for ore or the basis for vessel charters will need to be considered. Among those who have gone to Cuba, the Bermudas, to Venezuela or to Florida are Col. James Pickands and H. G. Dalton, of Pickands, Mather & Co.; W. D. Rees, president of the Republic Iron Co.; H. H. Brown, of H. H. Brown & Co.; D. B. Chambers, of the Stewart Iron Co.; L. B. Miller, of Oglebay, Norton & Co.

John Miller, a veteran Youngstown, O., foundryman, is proposed as Republican candidate for mayor of that city.

Overweights on Sheets and Plates.

The unreasonable exactions of boiler makers have at last driven manufacturers to the wall and they will no longer allow overweights unless they exceed those in our issue of October, 1895. It is a practical impossibility to roll large sheets to the exactness that boiler makers specify and, as we have so often warned, their unreasonableness has borne fruit in what we think is an equally unfair, but necessary stand on the part of the mills. It is one thing to handle a plate of steel cold and quite another to handle it hot, where every fraction of a second in its manipulation, affects its character. It is the mill's purpose to attain as near perfection as possible, and we are credibly informed that the product of the American manufacturers has no equal in the world.

It is a fact that on a given lot of, say, 100 plates that would average to a weight ordered, there would be no two that would be alike, and there would be a difference between the heaviest and lightest of fully twenty per cent. Such being the case how can any reasonable man ask a mill to keep within a range of weights that is absolutely impossible no matter how represented by price?—[Boiler Maker.

Of the market for plates, sheets, tubes, etc., the *Boiler-Maker*, speaking from the standpoint of that trade says: "Sales have become more plentiful and a disposition to cover for the future at present prices is very evident. This awakened interest is in itself a good omen for the future. We can confidently say that the outlook has considerably improved during the past month, and if the sellers of raw materials do not lose their heads and attempt to advance the market too rapidly, an excellent spring business at good prices seem practically assured. The conservative view is by no means a gloomy one, a statement that could not have been truthfully made 30 days ago."

THE IRON TRADE REVIEW

DEVOTED TO
IRON AND STEEL MANUFACTURE, FOUNDRY AND MACHINERY TRADES, IRON ORE PRODUCTION, TRANSPORTATION, AND GENERAL INDUSTRIAL PROGRESS.

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FEBRUARY 6, 1896.

ENGLAND'S COMPETITORS IN IRON AND STEEL.

The report has at last been published, of the delegation representing British iron and steel works employers and employes, that visited Belgium and Germany last summer to inquire into the conditions of iron and steel manufacture in those countries. There was some ill-humored comment on this tour, last year, by German newspapers, some of which seemed not to know that the visits to the various works were with the consent and co-operation of the proprietors. They forgot, too, that visitors from the Continent had been given like courteous receptions at the works of England and Scotland, from which they had learned much that aided them in their pioneering days. The report just now published in England refers to the general cordiality of the reception given the delegation both in Germany and Belgium, and adds that the daily minutes of the inspections and inquiries, as they were written out, were submitted to each works visited, to be carefully checked, so that every statement might be confirmed.

There were seven delegates representing employers and seven representing workmen. The presence of the latter and their full concurrence in the report probably explains its light touch on a phase of the question to which the British technical press has often given prominence—the handicap of British trade unionism, with its rigorous exactions, in contrast with the more amenable and more rigidly disciplined working force in Continental iron and steel works. This difference has been dwelt on time and again in London iron trade journals as a large factor in the inroad on the British product, made by the iron and steel of Belgian and German works.

While the wages paid at several works in the two Continental countries were gathered by the delegation, no general statement is made on the subject, nor are there any comparisons with average wages in the various districts of the United Kingdom. The report says, however, that at the Westphalian furnaces (that being the only district in Germany visited) the labor cost of pig iron is about 2s. a ton, and this is regarded as fairly typical. Commenting on the discovery made by the visitors that Westphalian iron workers are in general well paid, the average being but little below the British level, the London *Iron and Coal Trades Review* suggests that the iron workers of that province are the aristocracy of the working classes of Germany, and that if Silesia, Bohemia and Hanover had been visited, very different figures would have been found.

The labor involved in producing puddled bar from pig iron is reported as much lower than in the United Kingdom; but this is accounted for by the fact that the iron worked requires less labor. The waste from pig to puddled iron, 13 per cent, is about twice that in England. The average value of the pig iron produced in Westphalia in 1894 is officially given as 44.2s., the product being chiefly basic pig. In the Cleveland district in England 36.6s is the figure for basic pig. In the district of Charleroi, Belgium, the cost of producing pig iron is computed at 35s. 10d., and in another district of Belgium, 33s. 3d.

Belgium is reported to be at a disadvantage with Great Britain in the matter of fuel. The average value of coal in the Liege district, where the majority of the iron and steel works are situated is 7.785s. In Germany the average was 6.685s. in 1894 and in the United Kingdom 6.06s. The delegation notes, however, the very general adoption of retort coke ovens on the Continent. "Without expressing any opinion on the technical question whether the quality of the coke is in any way deteriorated by this process, as appears to be either apprehended or ascertained in English practice," the report merely refers to the difference in practice as an element in giving Continental countries fairly cheap coke supplies.

In the matter of ores it was found that Belgium's entire supply, except a small quantity, was imported, while of Germany's total only about 20 per cent was imported. In both countries there is a long ore haul. While the Luxembourg and Lorraine ores, in Germany, cost under 2s. at the mines, the long haul and their leanness make them cost more at the furnace than the ores consumed in Cleveland, Lincolnshire and Northamptonshire.

In the mills visited the production per man did not appear to average as high as in Great Britain. Yet the mechanical appliances place them well to the front. At the blast furnaces the general employment of the direct process and the system of carrying away the slag with water considerably lowers cost. In the finished iron and steel works the practice is referred to as excellent and in advance of that in Great Britain. The newer plants are exceedingly economical. The German Bessemer practice is admirable and the sheet and wire mills are late and labor-saving. This feature the visitors regard as one of the most prominent of continental manufacture. The engineering departments of the great iron and steel works are admirably equipped and when not doing work for the mills take outside orders. In many cases they make cranes, pumps, locomotives, mill engines, etc. Low cost of transportation is the one advantage in Germany and Belgium, to which the report attributes in large part the ability of Continental concerns to compete with British works. A large works in Germany, 150 miles from Antwerp, could get finished iron and steel to the seaboard for 3s. 6d. a ton, as against a rate three times as large for a like distance in Great Britain. Other instances are cited to the same purport. As against their comparatively high cost for ores the German and Belgian works generally have the coal on the spot. Their coal royalties, moreover, are much lower than in England. So much stress do the delegates put upon the element of transportation, that they say in their summing up that "if English manufacturers enjoyed the same railway rates and royalties as those on the Continent, foreign competition could be defied in neutral markets."

This represents practically the residuum of acknowledged Continental advantage that is to be found in the

report, after one and another favorable consideration had been neutralized by this and that handicap. A general statement in the delegation's "Conclusion" points out that "the success achieved by continental countries in the struggle for commercial supremacy is not so considerable as sometimes stated." This is evidently to reassure the gloomy prophets of a steady retreat of British iron masters before German and Belgian invasion. The fact is admitted that Germany and Belgium have taken some orders in England that might have been executed at home, but it is explained that both countries have customs tariffs which preserve their home markets to their home producers.

There is no elaboration on this last statement, but we opine that if the investigators are willing, they can find in this economic fact the key to very many of the conditions that are detailed in the report in their purely technical aspects.

POINTS IN SHOP ADMINISTRATION.

It is easy to get in a rut, and easier still to stay there. Some men have a positive genius for staying there; and to such men twice one is always two, no matter what the one and two represent.

Such men put in automatic machinery because Jones, over across the street, makes money by using automatic machinery. Jones is making small screws perhaps, by the million, for the market, while the other man is making something radically different; but automatic machinery pays Jones, and therefore must pay him.

Jones has his business subdivided to the minutest detail, and makes money; the other man uses many draughtsmen in his business and tries to subdivide brains.

He has a "head draughtsman" who knows a great deal, and a lot of other draughtsmen who know something less. The head draughtsman is responsible for the work of all the rest. The work is subdivided, and therefore it must be the proper way.

This is all wrong. Some labor cannot be subdivided. There should be a sufficient number of designers to do the work required. No designer should be expected to design more than one machine at a time and should not be expected to have anything else to think of while he is designing it.

This kind of subdivision is all right, but it doesn't usually go by that name.

Each designer should have as many draughtsmen assigned to assist him in detail work, as he requires for the work in hand at the time. The head draughtsman should be responsible only for the accuracy of the shop drawings. He should not be responsible for the success of the machine that is made from the drawings, nor should the designer be responsible for anything but the success of the machine.

The most encouraging thing about the future of the human race is this very fact that brains cannot be subdivided nor cornered in the market.

* * *

The first requisite for permanent success in manufacturing (or any other business) is character. Workmen should know that the employer's "word is as good as his bond."

The next requisite is "horse sense." "Watch the pay roll," is the motto of many manufacturers who are trying to carry their business along by "main strength" (same as the Irishman played the fiddle.)

The amount of the pay roll, in itself, has nothing to do with the case; the pay roll *compared with the output* is the important thing.

"That man is making too much." How often do we hear this from the man who is watching the pay roll so industriously that he has no time for anything else." What the man makes is not a factor. Does this man's *product* cost more or less than the other man's? That is the question.

In a general way, one three-dollar man is cheaper than two one-dollar men. Although he shows 50 per cent more on the pay roll, he takes less room and does more work. It costs as much to run the engine for the one-dollar man as the three-dollar man. It requires more invested in machinery for the one-dollar man, because he is slower; and in addition he ruins more machinery and tools than the three-dollar man. It costs as much to keep the one-dollar man's time, and it costs more to keep him out of mischief.

The employer who keeps faith with his men, and the high priced man who earns his money, are a strong combination, and one that will win in the end.

SCRUTATOR.

THE CLEVELAND DISTRICT.—Continued from Page 3

Billets and Rods. Bids on a round lot of billets in the Cleveland market develop an eagerness for business on the part of some of the steel mills and a quotation as low as $17.25 delivered is reported in this connection. The improvement in wire and in wire nails is expected to result in a larger demand for steel, but at the moment the feeling is weak. Wire rods are quoted $23 to $23 50, Cleveland.

Finished Material. The 2,000 cars referred to two weeks ago, are being placed this week by the Lake Shore and the Wheeling & Lake Erie. Of the 1,000 cars to be bought by the former, 500 were placed in Detroit. The balance of the two orders is to be allotted to day Car companies are said to be figuring on a large number of cars that will be placed East and West in the near future. Prices on bars are nominally unchanged, though on steel a recent Northern Ohio contract would indicate a near approach to the low figures of early '95. Quoted prices are 1.15c to 1.20c Cleveland on steel and 1.20c Cleveland, on common iron. The mills are running slack and both inquiries and orders are light. Plates are unchanged at 1.35c Pittsburg for tank; beams and channels are 1.49c Cleveland, and angles 1.34c Cleveland. Most of the agricultural works orders for plates and bars have been placed.

The option recently taken on three forties of the Mesabi Chief Iron Co., in section 23, 57-22, by the Lake Superior Consolidated Iron Mines is for 3½ months. Explorations made two years ago showed a good body of Bessemer ore, and it is believed the deposit is a large one. The Mesabi Chief is about 10 miles beyond the Longyear-Bennett holdings and the farthest to the west of any of the Mesabi properties yet explored.

The Oliver Mining Co. has secured an option on the Sauntry property, north of Virginia, Minn., and covering eight forties of section 5, 58-17. Two diamond drills will be put on the property and thorough exploration made. The pits now sunk will be deepened.

The Franklin Iron Mining Co., which operates the Franklin, Bessemer and Victoria mines at Virginia, Minn., is hoisting from the Franklin and Bessemer. The machinery at the Victoria is now completed and mining will soon begin.

The stripping carried on by the Mahoning Ore Co., since the close of its 1895 shipments, has laid bare 400,000 tons of ore.

SIXTY-TON BUCYRUS STEAM SHOVEL.

Reference has been made in these columns to the performance on the Mesabi range last summer, of the 60-ton steam shovel, manufactured by the Bucyrus Steam Shovel & Dredge Co , of South Milwaukee, Wis. This shovel was first designed especially for working on the hard sections of the Chicago Drainage Canal, where the material consisted of glacial drift, hard pan, clay and boulders, and constituted probably the hardest digging ever undertaken by a steam shovel. Blasting was unsatisfactory, not only on account of its great cost, but the material was such that it could not be effectively broken up by blasting. Seven of these shovels were furnished for work on the Chicago canal and the same type has since been adopted for mining iron on the Mesabi range without preliminary loosening of the material by blasts.

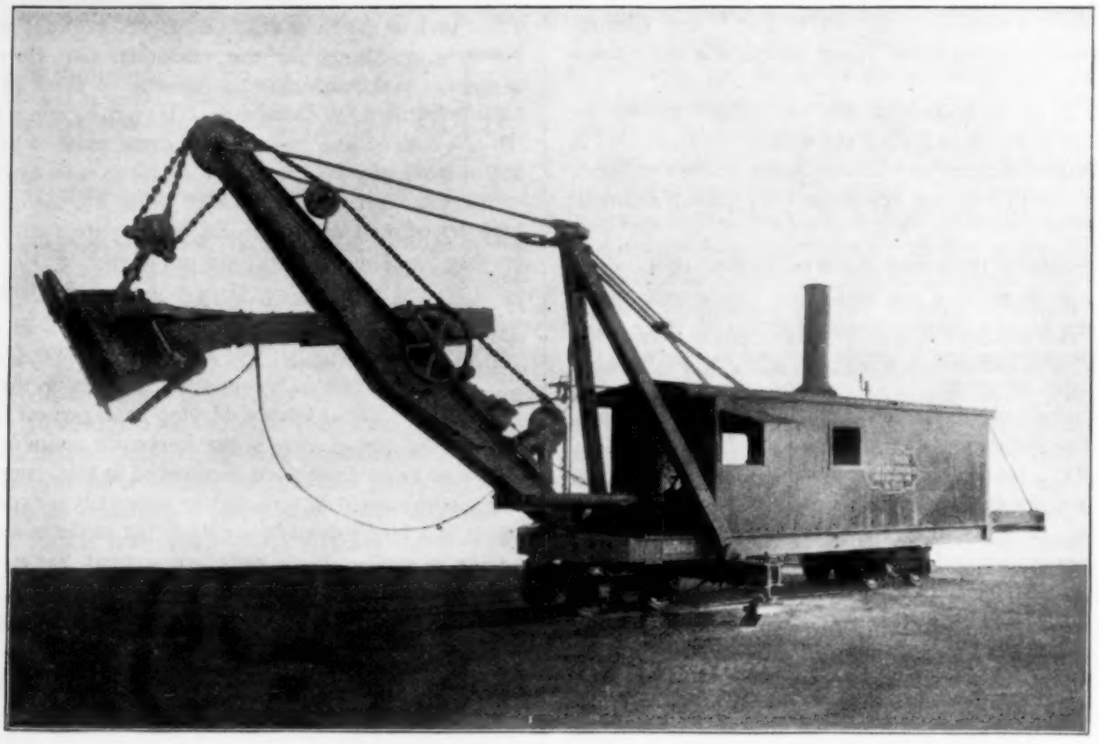


FIG. 1.—SIXTY-TON BUCYRUS STEAM SHOVEL.

In the accompanying illustrations Fig. 1 gives an idea of the size and general appearance of the shovel, and the strength of the parts subjected to severest service. Fig. 2 is a plan view of the machine, and Fig. 3 is a side-elevation drawing of parts forward of the boiler. The distinguishing features of the 60-ton shovel, as compared with smaller sizes are: 1, the high A-frame, which is built up of steel channels and plates, stepped upon a fixed jack-beam; 2, the great size and strength of the framing and all working parts subjected to strain; 3, the independent thrusting engines on the boom, which are of great power. These thrusting engines are capable of exerting 60,000 lbs. outward pressure on the dipper when it is digging. The dipper is given considerable angle of pitch with the handle, so as to make this thrusting motion effective when entering the bank. On other machines this thrust motion is obtained by means of a friction clutch, which is driven from the hoisting chain. The use of the independent thrusting engine greatly augments the digging power of the bucket and gives special facility in dislodging large boulders. In order to withstand safely the application of such a large amount of power, the boom, dipper-handle and dipper are of unusual size and strength, being as heavy as are used in large lake dredges. The dipper handle is of oak, 6″x15″, double, and is further stiffened by two steel angle bars 6″x6″x⅝″ running the entire length. These angle bars, in addition to contributing strength, constitute a wearing surface both on the top and sides of the dipper-handle.

In place of the usual wrought-iron side-arms and braces for attaching the dipper to the dipper-handle, a solid cast-steel frame is employed. This is flanged to fit the dipper-shell and the handle, and has formed in it eyes to receive the dipper bail and hinges. It is designed, too, so that the lines of strain from the dipper-handle and bail intersect in a point, and this point is close to and in line with the teeth. This concentrates all the strains on the upper part of the dipper, and brings them in more direct lines. The lower part of the dipper then becomes simply a receptacle for the material.

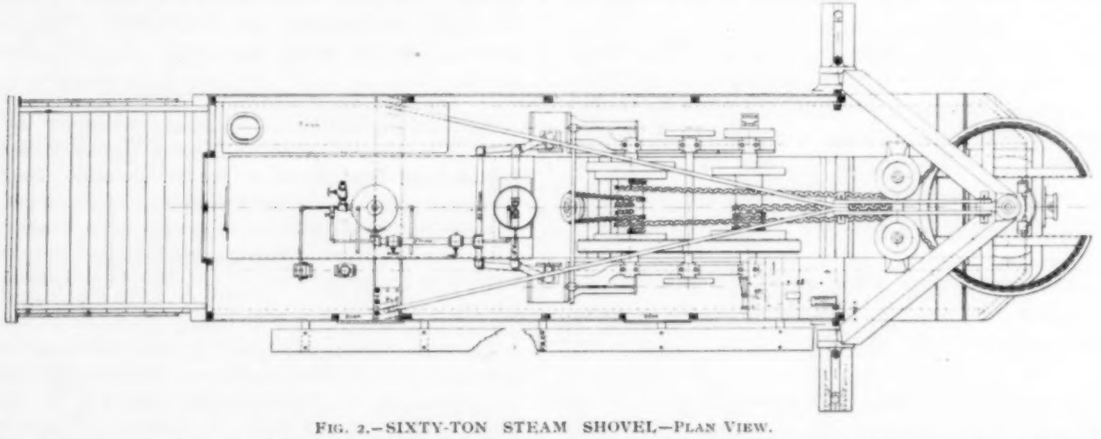


FIG. 2.—SIXTY-TON STEAM SHOVEL—PLAN VIEW.

Instead of hinged arms, as in the railroad machines, this is a through jack-beam, composed of two 15-inch steel beams 18 ft. long. This jack-beam makes a solid base for the "A" frame. which is stepped upon it, by heavy steel castings. All the principal castings throughout the entire machine are of steel,

There are only 28,600 lbs. of cast iron in the shovel, the total weight of which is 125,000 lbs.

The engines have two cylinders 10″x14″. The guides are bored and cast solid on the side-frames, and the cylinders are overhung. The cross-heads have a bearing 14″ long in the guides, or equal to the stroke of the engine, and the same principle of large bearing surfaces is carried out in every part of the machine. The frictions are of the outside band type, those of the hoisting and swinging being interchangeable.

Concerning the operation of this shovel at the Mahoning Ore Co.'s property on the Mesabi range, General Manager W. C. Agnew writes under date of Dec. 27, 1895: "During 25 days in August, working 10 hours, we loaded 54,250 tons, which is an average of 2,170 tons per day of 10 hours for 25 successive working days." This output was obtained without blasting, and the time includes considerable delays from car service.

THE Hamilton Iron & Steel Co., of Hamilton, Ont., expects to put its new 100-ton furnace in blast at once. For the present a large proportion of the company's ore will come from the United States, but it looks to the act of the Ontario Legislature passed in 1894, which provided for the payment of $1 per ton on the pig metal product of iron ore, raised or smelted in the province of Ontario, to bring about an almost immediate development of the mines of the province. In the meantime, the Hamilton Iron & Steel Co. will have to waive claim to the Dominion bounty of $2 per ton, so that it is entirely in its interest to push forward the exploration and development of Ontario mines. Ontario not possessing coal mines, and the question of economical transportation and handling of Lower Province coal being unsolved, the furnace company will have to use fuel from the United States. Under these circumstances the Dominion Government will probably restrict the Federal bounty to a sum proportionate to the amount of Canadian labor employed in the industry.

AT the Cleveland Steel Co.'s plant, the extraordinary output of 51 tons of 3-16 steel in 10 hours was made on Jan. 28. When the mill was put on a new tonnage basis last year, it was estimated that 20 tons could be turned out in 10 hours. The performance of last week is highly creditable to the management. Constant improvement in the equipment of the plant has been made by Supt. John A. Potter.

IT is announced from the office of the Condit-Fuller Co., of Cleveland, the well known jobbers in pig iron and finished iron and steel—bar iron, sheets, plates, tubes, beams, channels, etc.—that hereafter this corporation will bear the name of the Bourne-Fuller Co. In all respects, except in name only, the business will be conducted as heretofore.

THE American Pig Iron Storage Warrant Co. had 107,600 tons of pig iron in yard Jan. 31, 100 tons having been withdrawn and 1,100 tons put in, in the preceding 10 days.

REPLACING CAST IRON FLY-WHEELS.

Fly-wheel accidents have been frequent and disastrous enough the past few years to direct attention to changes in construction that will lessen these dangers. The increasing frequency of such accidents has led to experiments in wrought iron and steel construction as a substitute for cast iron. The Edward P. Allis Co., of Milwaukee, recently built a 24-foot steel plate fly-wheel for a 32 and 62x60 cross-compound engine, directly connected to a General Electric generator for the West End Street Railway Co., of Boston, It is a marked departure from the practice of employing cast iron segments and bolting them together. The internal strains of cast iron wheels are avoided and this, with other features tending to strength, permits of a greater velocity of rim than could be risked with cast iron wheels. The intended speed of this plate wheel is 75 revolutions per minute. A given point on the rim would pass through 90 feet a second, or more than a mile a minute. The weight is distributed as follows:

Center	33,000 pounds.
Web plates	47,600 "
Rim	69,300 "
Total	150,000

The hub is made of cast iron, and is eight feet extreme diameter. Surrounding this hub are two plates, which are split on the diameters. These plates are of steel one inch in thickness and 23 inches wide. From these plates extend the web plates, 16 in number, to the extreme outside diameter of the wheel. These plates are also one inch in thickness and are faced along the edges so as to form a good joint. Between those on the opposite sides of the hub are one inch by eight inch truss pieces bolted at the ends with two ⅞-inch bolts, and having at the center two 1¼-inch bolts to act as struts. These bolts are turned down to 1⅛-inches on the ends. These truss pieces are put at the joints between the web plates. Outside of the web plates are two cover plates, one inch in thickness and 27⅛ inches wide, which are also split on the diameter through the outside cover plates and web plates, and spaced so that three of them will come on each segmental web plate. Besides these bolts there are 48 1⅛-inch bolts on each side through the cover and web plates. The section of the rim between the web plates consists of 13 one-inch steel plates placed side by side and joining on the ends. The joints of these plates overlap, each plate covering seven joints of the others. Outside of the web plates on each side the rim are one-inch by 12-inch plates forming a cover around the entire rim. This cover is made of eight pieces. Still outside of this is another strip one inch by five inches also extending all the way round the wheel. The plates and the rim are held together by 1¼-inch rivets countersunk. The web plates in this construction form an infinite number of spokes, so to speak, and the increased strain on the rim between spokes is avoided.

Another remedy for fly-wheel dangers suggested in an article in *Industry*, of San Francisco, is to do away with fly-

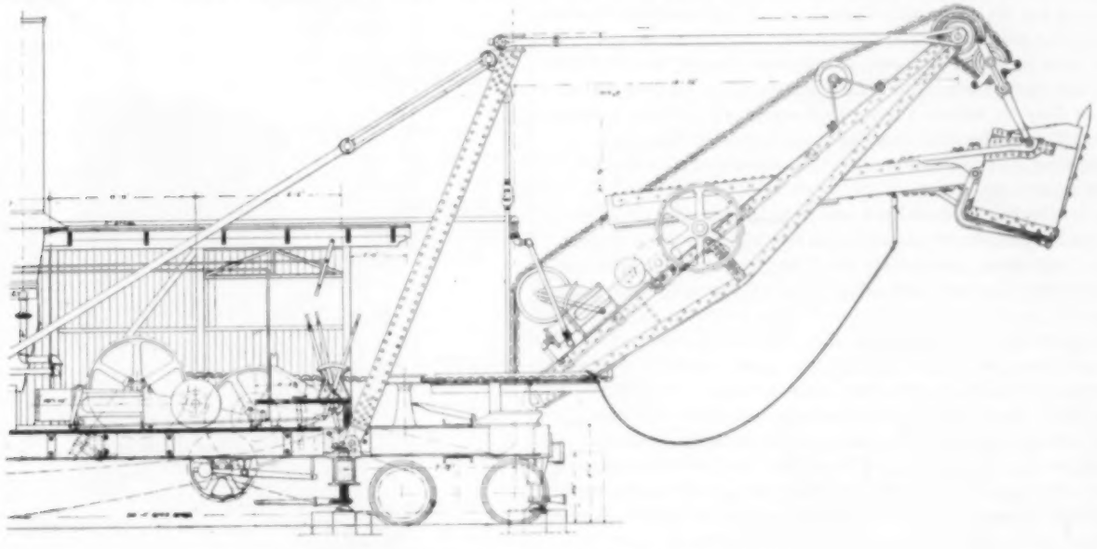


FIG. 3.—SIXTY-TON STEAM SHOVEL.—SIDE ELEVATION.

wheels. *Industry* quotes this statement of Manager Dickie, of the Union Iron Works, San Francisco, in the same connection: "We seldom make one nowadays and pretty soon will stop altogether wasting material in that way." Our contemporary then comments as follows:

Among the last dozen of large steam engines made in this city, there is hardly enough fly-wheel to supply one large slow speed single crank engine. Most of them, including all the marine engines, have no fly-wheels at all, and do not need any. Three engines, of 12,000 horse power each, for the Market Street Railway Co., have no fly-wheels. The principal engines in the Edison Electric Power & Light Co., have no fly-wheels, and it is easy to see how, with the present trend towards multiple cylinders, high speed and an equalized turning moment on the crank shafts, fly-wheels, if not wholly discarded, will become harmless and inexpensive.

In the conversation before mentioned, we asked Mr. Dickie what he would do in the case of a single cylinder engine. "Don't make any of that kind," he said, and when we came to think over the various engines seen under construction at the Union Iron Works, during the last year, only two with fly-wheels can be called to mind, and we think the sooner the various makers of steam engines set their cylinders vertical, employ not less than two, and leave the fly-wheel off, the sooner they will be in line of what is to be future good practice. At any rate, people will not feel much inclined to purchase machinery that involves cast iron wheels, moving at from 80 to 100 feet a second, something in Nature very like a steam boiler without a safety valve.

The work of steam engines, or their resistance, as we commonly say, can be rendered nearly uniform in degree for all kinds of duty, or within a limit that renders fly-wheels unnecessary. This is the case now for most kinds of duty, even air compressing, this requiring, as in the steam engine, two cylinders instead of one.

The functions of a fly-wheel are happily drawing to an end, not from incentives of economy, as might be, or from danger, which is becoming greater all the time, but in the regular sequential development and adaptation of the engines themselves.

It is tolerably easy to see how the danger comes about. The amount of iron, and consequently the main cost of a common fly-wheel can be inversely as the velocity at which it is driven, hence there is a constant commercial pressure towards the danger margin, also a like commercial pressure towards the cheapest material—cast iron; so, as Mr. Dickie recommends, the true way out of the difficulty seems to be in the direction of multiple inverted cylinder engines, which, if they require a fly-wheel, need only a small one.

When fly-wheels are required, either for the regulation of speed or as first movers to receive bands or ropes, they can be of wrought iron or steel, as they are now being made on this coast.

In U. S. court of appeals at St. Louis, argument was made last week in the suit of Alfred Merritt, Jr., against John D. Rockefeller, growing out of the formation of the Lake Superior Consolidated Iron Mines, and the transfer of Merritt interests on the Mesabi to the new corporation. In the U. S. court at Duluth the trial of the case last year resulted in a verdict of $940,000 for the plaintiff.

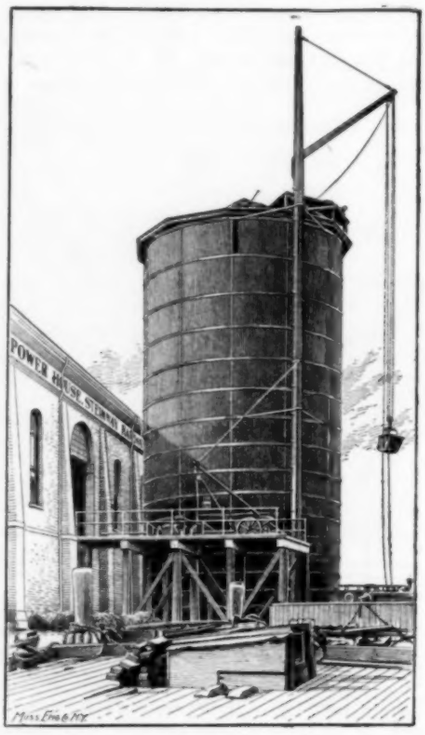
The preliminary work at the site of the proposed ore dock of the new Lake Superior & Ishpeming Railway, above Marquette, is under way. The dock will extend 1,700 feet from the shore and will have 200 pockets. The deck will be 54 feet above the surface of the water and 52 feet wide, and will have six tracks The approaches will be 2,500 feet long with double track.

The Mine Workers' Progressive Union, which seeks to enlist all the miners in iron and copper properties in the Lake Superior region, has been gaining strength in the past half year, the work of organization having been kept up steadily after the Marquette Range strike. The accessions have been chiefly on the Menominee and Gogebic ranges. Increased wages, an eight-hour-day, and the abolition of the system of employing a physician by the company, and assessing all miners so much per month for medical attendance, are the chief aims of the union.

PATENT CIRCULAR COAL POCKET.

An important element in the designing and building of power plants is the question of the proper storing of coal. A proper design for a power plant will provide storage room for from 500 tons to 1,000 tons of coal, and in larger plants this capacity should be very much increased. Danger of a coal strike, delay in transportation due to strikes, blockades, floods, etc., are risks which can only be provided against by ample storage room. The main difficulty encountered, however, is the large floor space required. The illustration shows a pocket lately designed by the Berlin Iron Bridge Co., of East Berlin, Conn., for the power house of the Steinway Electric R. R. Co., at Astoria, which has attracted much attention. The cylindrical form is unique and chief among its merits is the large amount of storage capacity in proportion to the exceedingly limited amount of floor space occupied.

This particular pocket is 28 ft. in diameter, 54 ft. in height, and has a capacity of 1,000 tons of coal. The coal is unloaded from the barge or carts, at the side of the pocket, in the ordinary way, and hoisted by means of a bucket to the top, an ordinary hoisting engine being employed. More expensive mechanical appliances might be introduced for doing this work—an endless chain or some of the other appliances of a similar nature, but it is doubted whether the revenue would pay the interest on the incurred cost, over the apparatus shown in the illustration. There is an opening in the side of the pocket, near the base, for removing the coal in the ordinary way, so that it can be carried into the boiler room by means of an endless chain, with buckets, or by hand, or by carts, or whatever way desired. The advantage claimed for this pocket is not in its presenting additional facilities for handling the coal, but more in its being an economical method of storing coal. As such it commends itself to owners of large steam plants, as it admits of greater capacity in proportion to the floor surface than any methods that have been devised. The patents on this form of construction are owned and controlled by the Berlin Iron Bridge Co., of East Berlin, Conn.



The physics of cast iron will be the most prominent topic before the Pittsburg meeting of the American Institute of Mining Engineers, the sessions beginning Wednesday evening, Feb. 18. The paper of Mr. Webster at the Florida meeting in March, 1895, was followed by a pamphlet discussion to which a number of members contributed. The discussion at Pittsburg will not be limited to the data published in the Transactions of the Institute. Thursday morning, Feb. 20, will be devoted to this subject.

THE USE OF PLUMBAGO CRUCIBLES.

Suggestions as to the most economical use of plumbago crucibles and cautions against practices that result in loss and waste have been prepared recently and are just issued by John A. Walker, vice president of the Jos. Dixon Crucible Co., Jersey City, N. J. We reproduce them as of interest to all who employ crucibles in the melting of metals :

I have in a previous article called attention to two good points in the use of crucibles, and in the way of a preface will here briefly recapitulate. The first is a proper annealing, about which the Dixon Co. advises as follows: Every Dixon crucible is annealed before leaving our works. All dry crucibles, however, are liable to absorb moisture in going from our shop to yours. On arrival at your works they should be immediately unpacked and stored in a warm, dry place to dry out any moisture possibly absorbed in transit, and to keep them from taking up further dampness. Then to provide against possible accident it is wise to re-anneal. Before being placed in a hot furnace the temperature of a crucible should in every instance, in the re-annealing, be slowly raised to at least 212° Fahr., or even a little above the temperature of boiling water. This will remove all moisture.

Any time a press of work compels you to use our crucibles immediately on arrival, and without the re-annealing up to 212° Fahr., if they scalp or flake off on the first heat the fault is not in the crucible. We cannot be held accountable for such accidents if our instructions are not observed.

An additional word is, if the crucible be a large one, after toasting its outside walls, set it over a black slow fire bottom side up, that the inside walls as well as the outside can feel the good of the toasting process.

The remaining point before noticed is that the melter shall keep in stock new crucibles—those not before in the fire at all, and also partly used ones—those that have gone sundry heats and have received the vitreous glaze which comes after several heats. Then for his new and slow fires put in the brand new crucibles, and heat them up gradually, but for the hottest fires always put a crucible in that is coated with the glaze.

The careful observance of these two hints will obviate most of the cracks and scalps which otherwise might take place on the first or second heat. A crucible having now got safely thus far, its future good behavior depends—

1st. On the fit of the tongs. In a fire hot enough to melt brass or copper, the crucible becomes soft and pliable. In lifting it out to pour, if the tongs do not fit, or are not made to grip the crucible at the right place, it is easily squeezed out of shape and liable to crack. The Dixon Co. suggests that the tongs be made to grip the crucible just below the bilge, so it will not need such a tight squeeze. Some melters use tongs shaped like the ace of spades; such tongs remove the coal much more easily than those of the regulation shape.

2d. On the kind of coal used for fuel. Coal with too much sulphur destroys, unnecessarily, the life of the melting-pot. I have seen a carload of crucibles give 25% more heats by a change of coal.

3d. The melter must not expect as many heats in melting one metal as another. From three heats when melting nickel to six in melting steel, to 24 in melting copper, the heats run up in the forties when melting composition.

4th. The drafts and dampers, if arranged to produce a reducing atmosphere, as against an oxidizing atmosphere, will lengthen the life of the melting-pot. An oxidizing flame is always unfriendly to a plumbago crucible.

5th. The flux used also bears on the same result. The binding materials in the walls of the crucible are impervious to some fluxes and easy victims to others.

6th. The time of heat is also to be allowed for. If with modern furnaces, high drafts, and taller stacks, the heat is taken off in 1½ to 1¾ hours, don't expect your crucible to stand this large punishment as easy as the lighter strain of a 2½ to a four hours' heat.

7th. If in ordering your crucibles you could give a hint to the maker as to what metal is to be melted, he could tell better what crucibles to send.

In the old days a crucible was a crucible; in these modern days we make by 20 different formulas, or mixtures as they are called. So tell your maker what you propose to melt, and you will get a crucible better adapted to the work and one that will last longer.

8th. After pouring your metal, don't roll the pot out of doors where it will get rained upon, or on a bed of wet sand, or where it will absorb moisture. If you do, you put it exactly where in its hot soft condition it will become spoiled either teetotally or partially. Also in lifting large pots by the crane, don't release the grip and let them drop four or five feet on stone floor; rather hold the grip until within two or three inches from the ground, and then drop them if possible on a bed of old dry sand.

9th. Don't leave any metal to cool in the crucible, but pour until the melting-pot is clean empty. In the parlance of the shop, don't leave the crucible so you will find a "button" in the bottom when it is cooled off.

In cooling, each button will have small threads or spikes of metal which will attach themselves to the soft crucible walls and get solidly stuck in them, and they tear the walls of the pot to get them out.

10th. In charging the crucible, don't wedge the scrap in too tightly; expansion and contraction go on in the heating and cooling, and a careful charging will provide for this.

Publications Received.

The latest catalogue of the School of Mechanical Engineering of Lehigh University, South Bethlehem, Pa., gives the schedule of studies, the detail of the shop visits, the work in mechanical technology, mechanics of machinery, machine designs, measurement of power, thermodynamics and metallurgy. Titles of the theses of the past year are given, indicating the lines in which students are expected to become proficient.

The Norwalk air and gas compressor is illustrated with the aid of copious half-tones and handsome letter press, in the latest publication of the Norwalk Iron Works, of South Norwalk, Conn. The uses of compressors have increased in recent years, as they have been improved. "We have been called upon," says the company, in the introduction to this catalogue of 105 pages, "to build machines to develop heat and to produce cold; to move air with a force hardly greater than the breath of a child, and to blow a shot from a cannon; to lift tons of iron and to clean a watch; to steer a vessel and to launch a torpedo to destroy her." Early types of compressors are shown and the improvements made from time to time are described and illustrated. The compound principle and the mechanically moved valve were first employed in Norwalk compressors. There are many interesting features about the catalogue before us that make it something more than the average trade circular.

A recent leaflet of the Playford Stoker Co., manufacturers of the Playford smokeless furnace, gives the results of tests of a return tubular boiler, equipped with the Playford stoker, at the works of Sipe & Sigler, Cleveland; also a duty test of three tubular boilers equipped with this stoker, at the Cleveland water works pumping station. In the latter Pittsburg slack was used. The evaporation was 8.09 lbs. of water per pound of coal, and 9.90 lbs. per pounds of combustible. The record states that in both cases the chimneys were free from smoke during the tests.

A new circular issued by the Morton Tin Plate Co , of Cambridge, O., gives its list of brands as newly arranged. All plates are made on Morewood tinning sets and palm oil is employed in the manufacture of every grade, all black plates being boiled in palm oil, soaked in molten tin and finished through palm oil. Seven brands of bright tin plates are made, ranging from the extra heavy coated "Regent" to the "Shamrock" (seconds from bright charcoal plates) and "Fern" (seconds from bright coke plates). In roofing tin, the "Neptune" plate, calculated for service under special exposure to destructive vapors, has 45 lbs. of actual coating to the box. Roofing tin is manufactured in rolls 14″x60′ and 20″x60′, in all qualities from 10 to 45 lbs. coating. Smooth rolled stovepipe iron in boxes is a specialty.

The district court at St. Paul, Minn., has authorized the receivers of the Walter A. Wood Harvester Co. to make 10,000 harvesting machines this year. It is reported that the assets of the company exceed $1,000,000 besides the plant and real estate, and that all its debts will be paid in full.

SHOP AND FOUNDRY NOTES.

Methods of Closing Cracks in Cast-Iron.—Many methods for closing cracks or pores in cast-iron have been devised, according to *Industries and Iron*. Chemical or other products, such as sal ammoniac, urine, are often used to cause the formation of an iron salt, easily oxidizable, which in a short time gives a certain quantity of hydrated oxide of iron. This is made use of very often to stop up leaks which develop in metallic cylinder. This method is, however, a somewhat lengthy one, several days being oftentimes necessary to obtain satisfactory results; that is to say, entire absence from leakage. A method of closing cracks or pores in a more rapid and certain manner has lately been devised by M. A. Demalght, of Brussels. The method is described as follows: The cylinder is filled with a certain quantity of perchloride of iron. The liquid is then compressed until globules appear on the external surface. The cylinder is then impregnated with perchloride of iron right through, as regards its thickness. Any perchloride in the cylinder is then emptied out, the cylinder being then wiped until the polished surface is again made brilliant. It is then filled with ammonia at 22° Baume, this also being subjected to compression. The effect of this operation is soon noticeable, the perchloride of iron in the metal becomes transformed under the influence of the ammonia into hydrated oxide of iron, at first somewhat frothy in character, and afterward under the influence of the external pressure, rough and compact. Some hydro-chlorate of ammonia also remains, which will soon afterward react on the iron, which will eventually be converted into an oxide compound, adding itself to the first. The leaks marked at the commencement of the operation will be entirely stopped up as soon as the ammonia commences to move out externally, the whole operation not occupying more than a couple of hours. One advantage of the new process is that leaks are stopped by an independent injection of hydrate of iron, whilst in the many processes at present in use, the result is obtained at the expense of the iron in the cylinder, that is to say, one part has to lose that which another portion gains.

Western Foundrymen's Association—The next meeting of the Western Foundrymen's Association will take place at the Great Northern Hotel, Chicago, at 7:30 p. m., Wednesday, Feb. 19. A paper will be read by Mr. H. Hansen, entitled, "Crude Oil as a Fuel in the Core Oven." The notice to foundrymen says: "If you have any question relating to foundry practice you would like to have discussed, please send it to the secretary, in writing." The address of Secretary Johnston is 1522 Monadnock Bldg., Chicago.

Recent Progress in Cast Iron Car Wheels.—It is hard to believe that there is a better material for street railway wheels than chilled cast iron of the best qualities. From 50,000 to 75,000 miles have been made with such wheels, a record which is certainly satisfactory and hardly excelled. The best brands of chilled iron are hardly distinguishable from fine tool steel. * * * Mr. P. H. Griffin says in a personal letter, "We have in the past five or six years directed our work specially towards the production of two distinct features in our metal—one, the turning of the chilled surface into the highest possible condition of combined carbon and iron, which is really nothing more nor less than the question of an exceedingly high grade of steel—and the other the production of a condition in the center or unchilled portion of the wheel that would make it especially remarkable on account of its strength. As a result, we have increased the hardness and resistance to wear of the chilled surface of our special wheels from six to eight times beyond the best ordinary practice, and the strength of the material in the center we have been able to increase over 100 per cent."—[Street Railway Journal.

Cast Iron Boxes for Machine Beds—Varied Uses of Milling Machines.—Writing for *Machinery*, John E. Sweet presents data of more than ordinary interest concerning noteworthy features of shop practice seen in a recent visit to several well-known establishments in England and Scotland. Two extracts are given below. The first relates to the increasing tendency to employ for the bed of machine tools a box casting extending to the floor. The other is on a subject of never-failing interest—the field of the milling machine. The practice referred to in the second quotation is that of the works of the Southwestern R. R. Co., at Nine Elms, London:

"At the works of John Lang & Son, at Johnstone, Scotland, they make it their business to build lathes, and one feature is that the bed is a box casting which goes to the floor, and when such a casting is a complete box, it is a good form in which to put the metal. About all mechanics are beginning to believe that cast iron in a machine pays good interest on the cost, and there can be but one question as to which is the best form to put it, whether in a box section of the largest size possible, which is the stiffest form practicable, or in a plain, square solid beam as suggested by Oberlin Smith, which embodies the anvil principle in its most complete form. The beam will sag by its own weight the most or as much as any form of any weight, and there is but one advantage, it may be the best to prevent chatter. * * *

"Casting the two cylinders in one casting is the practice [at Nine Elms]; a double boring machine used to bore both cylinders at once; and as the two valve chests are between the cylinders (the valve seats are not over 4¼ inches apart), a special milling machine is made to stand on its head, go down between and dress the faces and ports. How often we hear it said, 'This is the country where the milling machine was developed,' and the impression conveyed that comparatively little is done in other countries. Such a conclusion can easily be reached if one will only go in the right shop here and the wrong shop abroad. On the other hand, the reverse conclusion would be reached if the searcher for facts should go into the works of Alfred Muir in England, and in the shops of Tom, Dick and Harry here. I have been told by Americans that in no other shop in the world, not even in the Steinlen works at Alsace, can such a variety of milling machine work be found as in Alfred Muir's works at Manchester."

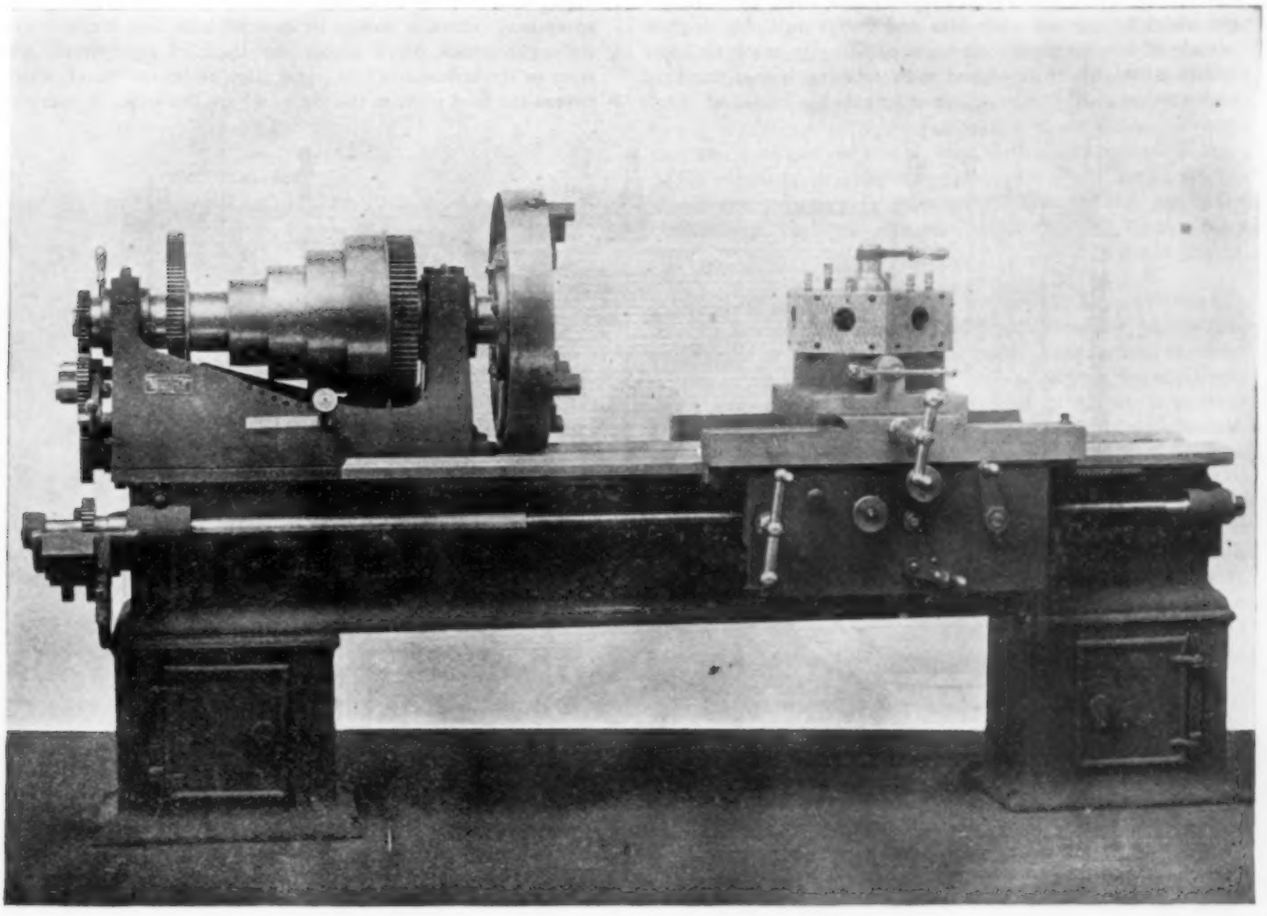
Machine Shop Methods of 30 Years Ago.—Speaking of the machine tools at the venerable Soho Foundry, in Birmingham, Eng., with which both James Watt and Matthew Boulton were prominently identified in their time, the *Engineer*, of London, says: "The tools are in certain respects unique. They form part and parcel of the place. They have been made where they stand. They are an integral part of the premises. We do not say that they could not be moved; we do not say that they were made without any idea that they would ever have to be moved. At every turn, too, we meet with devices which have been brought out time and again as new, and we feel that master minds have been at work—the minds of men who thought very clearly, who knew exactly what they wanted to do, and then did it in the best manner; and all the while we note that the influence of the millwright made itself felt, and that things were done as mechanical engineers would not do them now, but as they could have been done in Murdoch's day, or not done at all. There are square threaded screws, for examp'e, two inches in diameter, ten or a dozen feet long, four threads to the inch, and these have all been cut with hammer and chisel! What would the average modern fitter think if he was asked to undertake such a job? One of the foreman who has been for more than 30 years at the works told us that he very well remembers seeing some of the old hand cut screws with a chisel, and he was an apprentice when himself taught the art. The bar was supported in a triangular wooden trough, and the screw cut bit by bit to a template. It is easy to see that under these conditions screws would be used sparingly, at first, at all events. * * * In the principal machine shop, one end of which is used as an erecting shop, are two very heavy vertical planing machines. The frames are secured to the wall by stout braces, and the carriage holding the tool travels. The work to be planed is secured on a table at the ground level, and the planing is done on the side next the wall. The system was adopted because very heavy castings were made and had to be handled—castings weighing as much as nine or ten tons, and in later years as much as 25 tons, as, for example, the oscillating cylinders of the Irish channel mail boats. There were no planing machines that would carry such a load, and even if there were, it was thought much more economical of power to drive the tool along the work than to drive the work under the tool; and in the present day it is beginning to be found out that the moving tool is more economical than the moving casting. The principle has long been employed in plate edge planing machines."

24-INCH SCREW CUTTING TURRET LATHE.

In the 24-inch screw cutting turret lathe shown in the illustration and built by the Lodge & Shipley Machine Tool Co., of Cincinnati, the carriage is especially massive. It is 32″ long and the turret has a bearing on this carriage of 14″ wide. The carriage is supplied with both power, length and cross-feeds. This will cut threads from two to 28, including the following fractional threads: 2¼″, 2½″, 2¾″, 2⅞″, 3½″, 4½″, 5½″, 5¾″ and 11½″.

The turret measures 13½″ across flats and the index or division plate of the turret is tool steel hardened, as is also the locking pin. The turret slide is fitted with taper gibs which are tongued and grooved into the sides so that no amount of strain can disturb them. With this tool all chucking work may be done to the same advantage as in a regular chucking lathe, with the additional advantage of the large range of screw cutting.

The power cross feed is of advantage in that not only is a set-over obtained for the turret, but work may be faced in the most convenient way. The front bearing of the spindle is 4″ in diameter by 6½″ long and has a 1 13-16″ hole through it. The weight with an 8′ bed is 3,500 pounds.



TWENTY-FOUR-INCH SCREW CUTTING TURRET LATHE.

Early Tool Work on Ship Plates.

When the first attempts were made to build hulls of iron, there were very few tools of a suitable kind available. To start this kind of work was to start a new handicraft, and the men who were put to the work hardly knew themselves what they wanted, or what was likely to serve the turn. Some experience of the work was necessary to reveal the needs of the workmen, and how to furnish them with suitable appliances. The steam boilers of the time were the only structures whose manufacture demanded tools for clipping wrought-iron plates, and for punching holes in them. Boilers had been made of iron since 1786—nearly fifty years before iron was used for the building of ships. The haystack boiler and the flat-sided return-flue boiler had been constructed for the low pressures which were then deemed sufficient. And there were a few tools in existence that served, after a fashion, to punch and shear iron, and even to bend the iron plates, which, at that time, seldom exceeded ⅜-inch in thickness. If a young mechanic of the present day could see one of those primitive punching tools, he would hardly recognize in it any resemblance to the ponderous structures that are now to be seen in shipbuilding yards.

The punching machine of the early period consisted simply of a lever, the long arm of which was raised by a cam at a slow speed, and allowed to descend by its own weight. The short end was provided with a steel punch and, of course, a die was fitted underneath. This "bear," as it was called, was sometimes made of duplex form—another lever, working at the reverse end, did the shearing. And it is curious to observe that though the form is now altogether dissimilar, the principle on which these machines were designed is still maintained in the best machines of the present day.—[J. Arthur Gray, in Cassier's Magazine for February.

AMONG the articles of special interest in the February *Century* is "Pope Leo XIII. and his Household," by Marion Crawford, a personal account of the daily life of the Pope, accompanied by portraits and pictures from photographs of the Pope's private apartments. Henry M. Stanley retells "The Story of the Development of Africa," with reference to current events, and at a time when the Dark Continent is attracting particular attention his authoritative article will be read with new interest. Capt. Alfred T. Mahan, the distinguished naval critic, contributes the first of several papers on Nelson's naval victories, dealing with "Nelson at Cape St. Vincent," which is illustrated with portraits and diagrams. A paper written before the President's Venezuelan message, but dealing with the present situation, is "The Palmerston Ideal in Diplomacy," by Edward Mortimer Chapman.

THE Bethlehem Iron Co.'s steel mill resumed work Monday. The company has been pushing work lately on government contracts.

FOUR new concerns have been added recently to the membership of the National Iron Roofing Association.

FOR BETTER SHOP WATCHMAN SERVICE.

C. F. Simonson, general inspector for the Hartford Fire Insurance Co., in an address before a meeting of the officers and special agents of the company, made some strong points against the present system of shop protection by night watchmen. He believes the inefficiency of the existing arrangement is not to be wondered at, when 14 hours of service are exacted of a watchman—this at night when the city is at rest and with the watchman little rested by the sleep he must catch in daytime in the midst of the noises of the street and of household activity. The most perfect watch system will not compel a man to stay awake when nature demands sleep, and it is not to be wondered at that fires are discovered by others than watchmen and that sometimes watchmen have to be rescued by firemen. A new plan proposed by Mr. Simonson is the following:

"Select two men capable and fit to be watchmen, sweepers or helpers; let one begin his shop work at noon, when the factory closes at night he takes a round until satisfied that everything is all right and in proper shape, then eats his supper which he carries with him and enters into his regular rounds of watching. He watches until 11:30 reaching home before midnight. The second man relieves him at this time and watches until 6:00 A. M., when he eats his breakfast, starts the fire and opens the factory for employes at 7:00. Having had breakfast and the factory open, he is ready to go to his shop work until noon when he goes home and returns at 11:30 that night. In this way the expense would be no greater than employing a sweeper or helper during the day and a watchman at night; and each would have one half-day and one half-night at home. It is plain to anyone that a man with these hours at home could get the requisite amount of sleep. Change about could be had each week, so that the man who had the first half of the night to watch one week could have the second half the next week and vice versa.

"This system has been tried for the past two years by Chas. F. Elms Engineering Works and Lyon & Healy Organ Factory of Chicago, who recommend it highly and say that nothing could induce them to change back to the old system. No man can work continuously fourteen hours at night and have ten hours at home during the day for eating and sleeping; and be fit for work of any kind, much less that of watching and guarding millions upon millions of property values, in which it may be the safety of cities is involved, and I earnestly recommend that this system of watching be proposed and its adoption secured wherever possible."

THE Sharon Iron Co. is about to resume operations at its furnace at Sharon, Pa.

LINN BOILER, WITH PRECIPITATOR.

Wm. T. Hess, of Grand Rapids, Mich., has designed an effective precipitator in combination with the Linn water tube boiler, and practical operation at the plant of the Grand Rapids School Furniture Co. has demonstrated the efficiency of the equipment, and afforded a basis for the claims made by the designer. The larger illustration shows a boiler, with down-draft fire box, equipped with the precipitator. Fig. 2 represents the open heater, also designed by Mr. Hess, its inlets and outlets and provision for blow-off being plainly indicated.

The features on which stress is laid are the ease of access to all parts of the heaters and precipitators as well as of the complete boiler in combination with the precipitator; the method of supplying the precipitator with water, and the method of taking the hot water to the boiler from near the water line and from under a hood covering the pump suction, giving water at its greatest possible head, clean and clarified.

The mode of operating can be understood from the drawings. The feed water is received in the top and overflows the spray-pan, where it comes in contact with live steam. The sediment settles down along the shell of precipitator and rests in the bottom. Clear water rises under the hood, which covers the feed pipe, to the boiler where the water is received after having been boiled, and is free from sediment. A run of 10 months of boilers provided with these precipitators alongside boilers without them, showed the boilers with the precipitator attached free from scale, while two without precipitators shed a scale from the flues $\frac{1}{16}$ to $\frac{1}{8}$″ thick, at each monthly cleaning. The feed water, boiler compound, and pump service were the same on the entire battery.

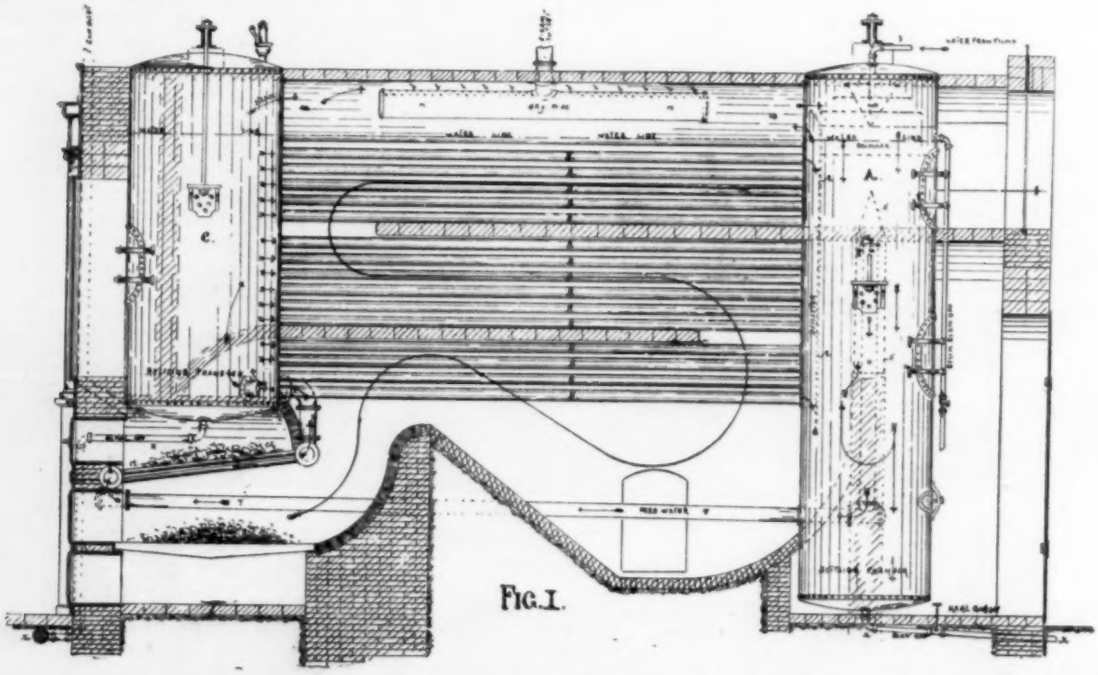


FIG. 1.

While the water tube boiler is not new, the special point of advantage in this boiler is the fact that the feed water is received at the lowest point of heat or outlet of breeching, and comes in direct contact with live steam, where it comes instantly to the boiling point as it falls in sheets from spray pan to pan. As it descends in this process, the sediment is precipitated and settles in the lower end of the header or precipitator.

The feed water is then taken from a hooded pipe reaching up to about a foot from the water line and thence delivered to the front header, where any sediment which remains in the water may find a second settling basin. From this header the circulation in the flues carries the remnant of sediment and deposits it upon the deflector or it settles to the bottom of the rear header. By this method, there is no cleaning of flues, as all the deposit is readily blown out from the bottom of the headers, and these headers work also as receiving tanks for the collecting of scum, and with the scum blow-off or surface

blow-off, this matter is reached, as it is collected readily and naturally in the rear header or precipitator.

It is not necessary that the boiler be set up at the shop. And for repairs, man holes are provided where the tubes may be drawn from either front or rear and not interfere with any of the mason work. Opening the outer doors and removing the man hole plates brings any desired flue within reach.

The construction of this boiler is advantageous in ease of access to all parts, in simplicity, in ease of cleaning, and safety in operating under high pressures. The arrangement of combustion chambers is noteworthy also, in throwing the heat about each tube where it can be absorbed and most effective. Other features are the form of our arches, providing the cooling chambers for settling basins, and the superheating of the steam at the final exit of the heat to the breeching. The fire

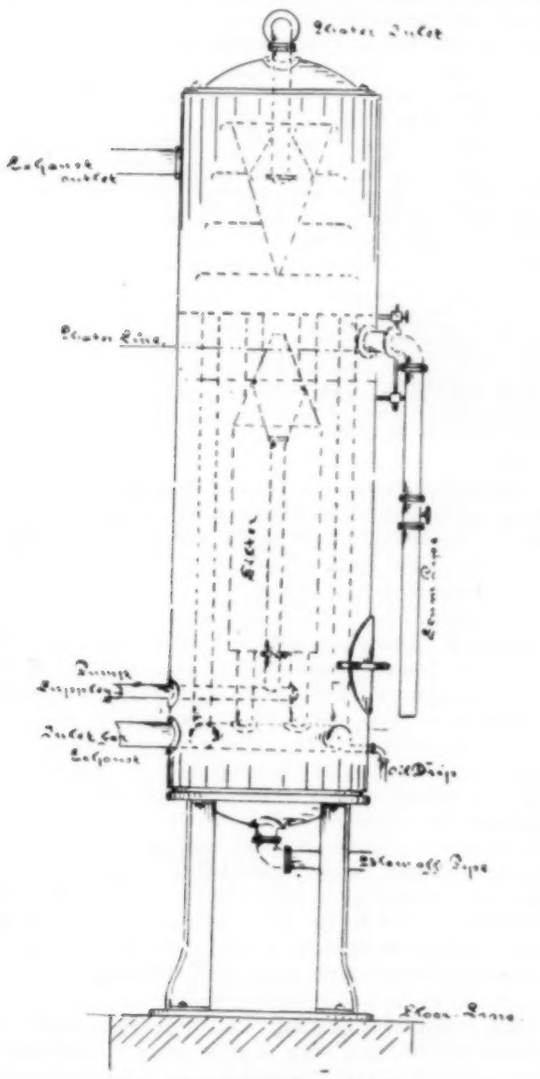


FIG. 2.—LINN OPEN HEATER.

is encased by brick walls and steam headers, thus protecting the cast front from the extreme heat required in steam producing service.

It will be seen that while there are no new mechanical appliances, the novelty in water tube boilers is found in the water feed, fire course and the simplicity of construction. The features referred to are covered by Patent No. 547,081, concerning which inquiries may be addressed to Wm. T. Hess, Grand Rapids, Mich.

THE Youngstown Steel Co., Youngstown, O., has just received an order for 1,000 tons of washed metal for shipment to Liverpool, Eng. Two orders from England were filled last year by the same company.

THOS. MAHER, Jos. A. Stone, C. A. Brayton, Thos. H. Graham and Terrence Dalton have incorporated the Cleveland Wheel and Foundry Co., capital $80,000. This corporation succeeds Maher & Brayton, of Cleveland.

OPEN-HEARTH PRACTICE IN GERMANY.

The German technical press gives the following details of recent experiments for the improvement of open-hearth practice, that have led to the adoption of some changes in furnace construction:

The two Siemens-Martin furnaces designed by Herr Schönwalder for the Friedenshütte have given very satisfactory results. The chief object of the construction adopted has been to permit of directing the gases into the furnaces as required, thus rendering uniform the wear of the gas and inlet walls, and of the furnace arched roof, as well as the progressive fouling of the checker brickwork in the regenerator chambers. To the objection that this result might be secured more simply by causing more or less gas to pass into one or other of the inlets by the insertion of bricks, the author replies that they would melt and could not easily be removed. Such an arrangement would constitute a regulating of the draught that could not be modified at will; and wear at any given point in the furnace would only increase, as the flames always pass most freely where the passage is easiest.

It was owing to these considerations that Herr Schönwalder made experiments with one of the furnaces, and, on account of the results obtained, ultimately modified and reconstructed both of them. Each of the four chambers was divided into two by transverse walls, thus affording, on each side, two compartments for gas and two for air, the draught in each of them being regulated by the dampers. Moreover, with a view to obtain a distribution as even as possible of the gas in the checker work, orifices communicating with the furnace have been provided in the corners of the chambers opposite the inlets of the flues.

The vertical flues have been arranged so as to prevent the direct contact between those for air and those for gas, so that there can be no communication between them, while the wear is greatly reduced. Lastly, the wall separating the chambers permits of giving three points of support to the transverse girders supporting the sole or bottom, which is open underneath and may therefore be cooled and inspected readily, while the arched roofs of the chambers have no weight to bear. The distribution is effected by the method of two coupled bells, an arrangement adopted almost exclusively in Silesia that appears preferable to the ordinary valves, which are liable to jam, and require frequent renewal. A difficulty occurred in connection with the dampers to be placed in the flues in front of the chambers; and it has been very happily overcome by the adoption of firebrick dampers. These dampers are always tight, and last at least a year without repairs, notwithstanding the high temperature to which they are exposed.

The first experimental furnace was built at the Friedenshütte in 1890 and completed by the successive improvements indicated by practice. Whereas formerly, at the outside 191 casts, yielding 2,300 tons of ingots, were obtained without repairs, by degrees it was found possible to make 1,000 casts under the same conditions of working.

In a first campaign of eight months, comprising 205 working days, 712 casts were made producing 8,562 tons of ingots, corresponding with 3½ casts per 24 hours, each cast yielding a little more than 12 tons, or equal to considerably more than 40 tons daily. The number of casts is greater when there is no necessity to work with as much as a ton of flux per cast, as is the case at the Friedenshütte, where transition pig of all kinds, some of it high in phosphorus, is converted in the Siemens-Martin furnace. The total number of the above-named casts is divided into: 532 with a phosphorus content less than 0.05 per cent, 162 from 0.05 to 0.08 per cent and 18 with a phosphorus content greater than 0.08 per cent, making 712 together; and into 594 casts with a carbon content less than 0.1 per cent, 103 from 0.1 to 0.2 per cent, and 15 from 0.2 to 0.5 per cent, also making 712, so that what is made is chiefly extra mild steel.

After these 712 casts, some repairs were made (which took up 15 days) chiefly to the arched roof, the front and back walls of the furnace and the checker brickwork of the chambers. The air and gas inlets were found to be worn, but evenly, and in sufficiently good condition for another series of casts.

ABSENCE of snow makes wood scarce for Michigan furnaces.

CHEMICAL ANALYSIS OF IRON AND STEEL.

The belief is quite common, especially among those who have had little or no experience in the practical work of steel manufacture, that a thorough chemical analysis will indicate precisely the character and quality of steel; yet those who are more familiar with such matters have long been aware that this is not at all the case, and it is a fact that two different brands of steel which will appear to be precisely identical, so far as the most rigid chemical analysis can show, will be totally different when put into service, and will give different results under physical test.

Nearly, if not quite, all the prominent steel makers of this country have made steel springs to the specifications of the Pennsylvania Railroad. These specifications require that the steel shall show a certain chemical analysis; and yet, it is a fact that one certain maker, who makes steel which conforms to the requirements precisely, so far as chemical test can determine, yet not more closely than the other makers conform to it, gets, in the open market, a considerably higher price for his springs than any other maker. And the railroad company in question has demonstrated to its satisfaction that it can afford to pay this higher price, because the springs, notwithstanding that chemical analysis shows them to be precisely identical with the others, give enough better results in service to more than justify the higher price.

It is the same with fine irons. Take Swedish iron as an example. It is well known that this iron possesses certain qualities not possessed by any other known iron, and finer steel can be made of it than can be made of any other iron known; yet irons have been produced in the United States which, so far as the most exhaustive chemical tests can show, are precisely identical with this Swedish iron.

In short, it seems to be clearly demonstrable that a chemical test will not tell us all we must know about such matters. But recently the microscope has been applied to this work, and it has been found that where chemical analysis fails to show the difference between two specimens of steel or iron, the microscope will show a very decided difference between them, and the difference thus shown seems to bear some relation, more or less exact, to the differences that are shown by the same specimens under physical test.—[American Machinist.

Industrial Additions to Chicago Heights.

Chicago Heights, Ill., continues to be the scene of much industrial activity. Nearly all the works located at this town are running full night and day, and have been doing so for some time. The Chicago Heights Land Association, through its enterprising manager, M. H. Kilgallen, has lately added several good concerns to those already located at Chicago Heights. The Hill Cart Co., of Romeo, Mich., employing 150 men, has just made arrangements to move into a steel and corrugated iron building, 70 by 300 feet in size, and will continue at Chicago Heights the manufacture of wagons, carriages, carts, etc. The Abbott & Rowland Co., employing 100 hands, will remove its plant for the manufacture of carriages and buggies, now located at 39th st. and Stewart ave., Chicago, to a two-story building, 50 by 200 feet, which has been erected for it at Chicago Heights.

Another recent acquisition to Chicago Heights is the Chicago Waterproof Cloth Co., which employs 150 men and girls, in the manufacture of mackintoshes and rubber goods. This company has leased the plant of the Variety Iron Works, for a term of five years. The plant includes two buildings, each 60 by 100, two stories high, of brick and stone, and a battery of four boilers and engines.

Mr. Kilgallen is at present figuring with several other large manufacturing concerns, and will probably close with them in the near future. The prospect is bright for an increase in the value of property in Chicago Heights, and is of course enhanced by the various new plants that are constantly being located there.

MATTHEW ADDY & CO., of Cincinnati, have just established an office at 975 the Rookery, Chicago, under the management of A. C. Hawes, for the sale of pig iron, old rails and old wheels. Mr. Hawes has a long experience in the pig iron trade in this territory, and will no doubt be able to do a large business for Matthew Addy & Co.

CAPITAL IN IRON ORE MINING AND SHIPPING.

In his paper read at the International Waterways Congress at Paris in 1892, the late Geo. H. Ely, of Cleveland, presented figures which showed, with an approach to the actual, the vast aggregate of investments in the various mining, dock, vessel, railroad and other interests connected with the mining and transportation of Lake Superior iron ores. These figures, with some revisions, were put before the Wilson tariff committee at Washington in the following year. The same ground has lately been covered by Harvey D. Goulder, of Cleveland, attorney for the Lake Carriers' Association, who went to Washington last week to urge upon the River and Harbor Committee the interests of the vessel men pending legislation. The figures of Mr. Ely were brought down to Jan. 1, 1896, by Mr. Goulder's inquiries among vessel, dock and railroad companies, and the additions presented side by side with the old figures by the *Marine Review*. The prodigious total of $233,242,085 is shown. The distribution of this enormous investment is shown below, with the corresponding figures in Mr. Ely's compilation:

	July 1, 1892.	Jan. 1, 1896.
Capital in mines in the four Lake Superior districts in 1889, as per United States census..... $54,825,122		
Increase to July 1, 1892..... 15,000,000	$69,825,122	$90,325,122
Capital in docks and their equipments at Lake Superior and Lake Michigan ports, built and used exclusively for shipping ore (official).....	9,885,665	14,185,665
Capital employed exclusively in railroad transportation of ore from mines to shipping ports on Lake Superior and Lake Michigan (official	27,014,594	32,364,594
Floating capital on the lakes, employed exclusively in ore transportation, from upper lake to lower lake ports (estimated).....	29,933,107	46,680,207
Capital in docks, and in their equipments, for receiving and forwarding ore exclusively, at Lake Erie ports between Toledo and Buffalo, inclusive of both (official).....	12,392,880	15,492,880
Capital employed exclusively in railroad transportation of ore, inland to mills and furnaces from Lake Erie ports (official).....	26,343,617	28,193,617
Total.....	$175,394,985	$233,242,085

The additions under the head of "Capital in mines" are largely comprehended in Mesabi range properties. The new range is responsible also for much of the added investment in upper lake docks and railroads. The total additions to Mr. Ely's figures are $57,847,100.

HUGH F. DEMPSEY, ex-district master workman of the Knights of Labor, was pardoned by Gov. Hastings, of Pennsylvania, last week. Three years ago Dempsey was sentenced to seven years in the penitentiary, having been convicted of complicity in the poisoning of non-union men employed in the Homestead mill after the strike of 1892. Beatty and Gallagher, who are now in prison, testified against him, but Gallagher has since said that his testimony was false. There was no doubt about a poisoning conspiracy, scores of men having been made ill by croton oil that was put in their food, many of them dying, but there was room for doubt as to the part Dempsey had in it. H. C. Frick wrote a letter to the board of pardons, saying he would not oppose the pardon of Dempsey, if it were given as an act of clemency.

THE Gates Electric Mfg. Co., 1140 Monadnock Bldg., Chicago, made a voluntary assignment to the Chicago Title & Trust Co., Jan. 31. The creditors are principally employes, who have not been paid for three weeks past. They struck for money due them, which precipitated the failure. Eastern houses are also creditors to a limited extent. Liabilities are estimated at $10,000 and assets nominally at $17,000, consisting of machinery, stock, tools and accounts receivable. J. Holt Gates is president and manager; W. F. Camp, Jr., secretary and treasurer; Adolph Lissau, superintendent, and Otto Lissau, electrician. Poor collections are said to have caused the failure.

FORSTER, WATERBURY & CO., 636 638 the Rookery, Chicago, sales agents for the Iroquois Furnace Co.'s pig iron, have been made Western agents for the Bessemer pig iron, soft steel blooms, bars, machinery steel and steel sheet and tin plate bars made by the Junction Iron & Steel Co., of Mingo Junction, O. This company has lately put in new rolls and machinery, and is now prepared to turn out a large number of sizes and shapes of steel. Forster, Waterbury & Co. will undoubtedly turn a large amount of business in to the Junction Iron & Steel Co.

INDUSTRIAL SUMMARY.

New Buyers in the Market, and Some of Their Wants:—

[If you are in need of machinery of any description, please notify *The Iron Trade Review* and we will put you in communication with our advertisers at once.]

Emmet Horton, Elmira, N. Y., will buy a milling machine and a radial drill.

On Jan. 27 a charter was granted at Harrisburg, Pa., to the Titusville Iron Co., of Crawford county, with a capital stock of $250,000.

The Schlessinger & Yeomans Mfg. Co. has been incorporated at Chicago, with a capital stock of $10,000, to manufacture bicycles, by Louis Schlessinger, L. H. Jennings and H. G. Wright.

Frank Heierman & Bro., Austin, Tex., want a 36-inch and 20 foot screw cutting lathe with all latest attachments, 30-inch and 30 inch and eight-foot planer, and about 36-inch or 40-inch drill press.

The Excelsior Foundry Co. has been organized at Bay City, Mich., by Messrs. C. T. Wilks, W. W. Billington and G. E. Wanless. A plant has been leased for six years and the machinery is now being placed in position.

The Black Diamond Coal Co., Knoxville, Tenn., is in the market for 11,000 feet of ⅜-inch best crucible steel wire rope, seven wires to the strand; also 5,000 feet of one-inch best crucible steel wire rope, seven wires to the strand, for drum haulage.

At the office of the Supervising Architect, Washington, D. C., sealed proposals will be received until 2 P. M., Feb. 26, for all the labor and materials and fixing in place complete the low pressure steam heating and mechanical ventilating apparatus, power boilers, etc., required for the U. S. Court House and Postoffice building at Detroit, Mich.

Fires and Accidents:—

Fire damaged the premises of the Garvin Machine Co., New York, to the extent of $5,500, Jan. 24.

The plant of the Webster Mfg. Co., Chicago, was damaged by fire to the extent of $2,000 last week.

At Milwaukee, Jan. 30, fire in the four story brick building on East Water street, occupied by the Wisconsin Iron & Wire Works, Bolte Cycle Manufacturing Co., and Milwaukee Brass Mfg. Co., caused a loss of about $10,000, chiefly by water.

The plant of the Cleveland Wire Spring Co., at the corner of Wason and Hamilton streets, Cleveland, was destroyed by fire Feb. 3. The loss is estimated at $30,000. There were two buildings, one frame and the other brick. The former was 200x50 feet, and the latter 200x85 feet. The brick building was completed a month ago, and just occupied. The frame structure was almost empty, only a small amount of stock being stored there, the machinery and other appliances having been moved to the new building.

The large boiler at the mills of the Hollidaysburg (Pa.) Iron & Nail Co. exploded at 7.15 A. M. on Jan. 30. It shot through the roof into mid-air, ascending about 300 feet. In falling, it struck about 75 feet from where it had stood, crashing through the southeastern end and reducing that portion of the build ing to fragments. Three men were killed outright and two died later. Several others are seriously injured. The engine was not running at the time, the night shift having just gone off. The boiler was full of water, with about 100 pounds of steam on.

New Construction:—

The Pioneer Rail Renewing Co., whose lease of the Illinois Steel Co.'s North Chicago rolling mill expired some time since, is arranging to locate at Joliet, where it will build a mill of its own, if present plans mature.

The contract has been closed for building the new Talcot Forge Works, which are to be removed to New Haven, Conn., from Springfield, Mass. The main building is 70x90 feet, and will be ready in about a month.

The new National galvanizing works are being pushed at Versailles borough, Pa. They will be 400x150 feet and the foundation will be ready for the superstructure by March 1. A warehouse 100x100, a power house and an office will also be put up.

The McAleenan Boiler Co., of Peoria, has about completed the erection of its new shop. A large riveter stands near the center, while the other heavy tools are so arranged as to be easily accessible. The shop, when complete, will be one of the largest in the West.

The Berlin Iron Bridge Co., of East Berlin, Conn., has just completed for the Newport News Foundry Co., at Hampton, Va., a large foundry 40′ wide and 160′ long, the central portion being controlled by a traveling crane. This is one of the best and most modern foundries of the Southern States.

Additions, Enlargements, Removals, Etc.:—

The Fair & Day foundry, of Knoxville, Tenn., will build an addition.

The Racine Iron Co., Racine, Wis., is building an addition to its foundry, and installing an electric light plant.

It is reported that the plant of the Arcade File Works at Anderson, Ind., will be enlarged to double its present capacity at once.

The Newport (Ky.) Rolling Mill Co. has begun work on an addition. A new engine will be installed and employment will be given to an additional force of men.

The Follansbee Bros. Co., of Pittsburg, has purchased additional ground adjoining its Allegheny tinning house, and will enlarge the plant. The company has already ordered new machinery for this purpose.

General Industrial Notes:—

The Ohio Iron Co., of Zanesville, O., expects to b'ow in its furnace this week.

It is stated that the rail mill of the Johnson Co., at Lorain, O., will start next Monday.

The Georgia Mining & Mfg. Co. is preparing its furnace at Chattanooga, Tenn., for blowing in.

The Elk Rapids Iron Co., of Elk Rapids, Michigan, expects to have its charcoal furnace in blast in May.

The Weston Furnace Co., Manistique, Mich., will blow in its charcoal stack some time in the coming spring.

Hannah furnace of the Mahoning Valley Iron Co., at Youngstown, O., will probably be put in blast the coming week.

The American Wire Nail Co., Anderson, Ind., has shut its plant down for a short time, because of overproduction.

Mounters in the Baldwin & Graham Stove Foundry, at New Castle, Pa., refused to work at a reduction of 15 per cent.

The old rail mill of the Edgar Thomson Steel Works, closed down for some time for repairs, was started up Feb. 2 in full.

The Denver & Rio Grande has placed an order with the Colorado Fuel & Iron Co. for 6,000 tons of steel rails for spring delivery.

The Clifton Iron Co. has made plans to remodel and repair one of its furnaces at Ironaton, Ala., but the work will not be done for some time.

The Tonawanda Iron & Steel Co., of North Tonawanda, N. Y., has its new stack almost completed and expects to put it in blast about March 1.

Sarah furnace, at Ironton, O., blown out Jan. 8, has a new hearth and inwall nearly completed and will be ready to resume in a few weeks.

Owing to the low price and poor demand, the E. & G. Brooke Iron Co., of Birdsboro, Pa., has closed the puddling department of its works.

The Basic City (Va.) Chilled & Rolled Iron Works has borrowed $100,000 on its property, and it is said will resume operations at an early date.

The Quincy Boiler Co., Quincy, Ill., has been reorganized, and the company is now in the hands of Fred. B. Henry, J. William and Louis Grimm.

It is announced that the termination of the receivership of the Pottstown Iron Co. is near at hand. The creditors have agreed upon a plan of reorganization.

Two of the Cambria Iron Co.'s stacks at Johnstown, Pa., have been banked; also the furnace of the Blair Iron & Coal Co. at Hollidaysburg, which is under the same management.

McIntosh & Hemphill Star tin plate mill, Pittsburg, has been started up slowly to get the machinery in shape. The firm expects to turn out tin and black plates by March 1.

At the Ingersoll-Sergeant Drill Works at Easton, Pa., the machinists struck because they were asked to handle non-

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union castings. The molders' strike began two weeks previous.

It is said that the largest iron smokestack ever constructed in New England was erected in Rockville, Conn., last month. It is 100 feet high, 54 inches in diameter and weighs 10 tons.

The Vulcan Iron Works, Toledo, O., at its annual meeting elected the following officers for the ensuing year: President, A. L. Backus; vice president, M. I. Wilcox; and secretary, John W. Smith.

The National Tube Works Co. is experimenting with electrical power at its McKeesport mills. The machinery an No. 8 welding furnace was electrically operated last week as an experiment.

The Youngstown Bridge Co. shipped last week the largest bridge girder ever sent out of its works. It is 91 feet in length, nine feet deep and weighs 50 tons. Three flat cars were required to ship it.

The Lassig Bridge & Iron Co., of Chicago, has lately taken contracts for furnishing 226 coal spouts, plate girder and lattice span bridges, amounting to about 400 tons for the Duluth & Iron Range R. R.

The Phœnix Bridge Co., of Phœnixville, Pa., has secured the contract for the frame-work of the new United States cruisers to be built at Newport News. The contract will give employment to many men for several months.

At the annual meeting of the directors of the Riverside Iron Works, of Wheeling, it was decided to increase the capital stock by 33 per cent out of the accumulated surplus. In addition, a cash dividend of 4½ % was declared.

Work on changes contemplated in the Bay View rolling mills of the Illinois Steel Co. has been suspended pending further order from Chicago. The principal improvement about to be made at Bay View is the rebuilding of the plate mill.

A Sharon, Pa., dispatch says that the Standard Oil Co. has leased the Woods Valley mill in Wheatland and will put it in operation in March, adding a department for manufacturing hoop iron. The mill has not been steadily operated for 20 years.

The A. Garrison Foundry Co. is building a mill to roll aluminum for the Pittsburg Reduction Co., at New Kensington, Pa. The train consists of a 28x84-inch roughing mill for breaking down and a 28x84-inch finishing mill of improved design.

The Colorado Fuel & Iron Co., Pueblo, Col., produced in 1895, 59,494 net tons of pig iron, 3,386 net tons of spiegel, 3,470 tons of castings, 4,357 net tons of cast pipe, 43,238 net tons of steel rails, 2,674 tons of spikes, 1,629 tons of angles and 15,904 net tons of merchant iron.

The Carnegie Steel Co., Ltd., has made a readjustment of wages at the Duquesne Steel Works which reduces the wages of from 50 to 60 tonnage men from 12 to 20 per cent. The reduction affects employes in the new billet mill, which has a capacity 27 per cent greater than the old mill.

At the annual meeting of the stockholders of the Cambria Iron Co., held in Philadelphia on Jan. 21, the following board of directors was elected: Josiah M. Bacon, Robert F. Kennedy, James McMillen, David Reeves, Powell Stackhouse, Edward T. Stotesbury, John W. Townsend, John Lowber Welsh, and R. Francis Wood.

The Davis & Egan Machine Tool Co., of Cincinnati, (formerly the Lodge & Davis Machine Tool Co.) has just been awarded the medal for the best line of drill presses on exhibition at the Atlanta Exposition. This company has received an order from the Lombard Machine Works & Supply Co., of Augusta, Ga., for one of its largest tools.

A Pittsburg dispatch says: Suit has been entered in the United States Circuit Court by John Brislin and Antonio Vinnac against the Carnegie Steel Co., Ltd., for $100,000 damages. The plaintiffs are inventors of a feed mechanism for rolling mills, and allege that the defendants now have four of these devices in use, and that they refuse to desist or pay for their use. A suit for the same amount has also been brought

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1—Bement Car Axle Lathe.
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1—30x30x8 ft. Harrington Planer.
1—36x36x18 ft. Sellers Planer.
1—36x36x20 ft. N. Y. Steam Engine Co. Planer.
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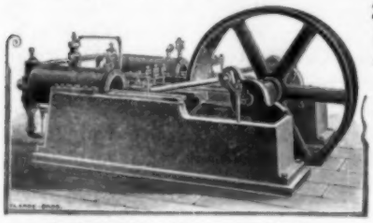

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against Jones & Laughlin's American Iron Works, where four similar devices are in use.

The Corrugated Iron & Steel Roofing Co., of Ironton, O., has been incorporated and organized with the following officers: H. A. Marting, president and gen'l manager; W. M. Kerr, vice president; Charles Horn, secretary and treasurer; August Fillgrove, asst. manager. Land has been bought and a 42x80 ft. building will be put up.

The directors of the Niles Tool Works Co., Hamilton, O., at their annual meeting elected Alexander Gordon, president; James D. Parker, vice-president; James K. Cullen, secretary, and Robert C. McKinney, treasurer and general manager. The company declared the usual three per cent dividend on the common stock for the six months just ended. The preferred dividend is paid regularly without formal action.

The Pennsylvania Tube Works, at Soho, Pa., whose maximum size of wrought iron tubes has been 24 inches, recently turned out a 28-inch lap welded pipe, the largest yet produced. It was 20 feet long and weighed 1½ tons. The iron is $\frac{7}{8}$ inch thick. This pipe will be used in water service. In short sections it will be extensively employed for steam drums, cylinders, etc. The 24-inch pipe of the company, the maximum heretofore, has been used in steam connections; its 20-inch pipe in gas lines.

The Ætna Foundry & Machine Co., of Youngstown, O., was reorganized last week. Lloyd Booth, of Youngstown, will be president; H. M. Garlick, of Youngstown, vice president; J. W. Russell, of Warren, secretary and treasurer; W. Strouche, general manager. The latter comes from Anderson, Ind., and is the inventor of apparatus for use in making tinning machinery. The output of the concern will be much enlarged.

A compromise is reported between the Watts Steel & Iron Syndicate of Middlesboro, Ky., and the American Association, Ltd., by which the former in consideration of a certain sum of money secures control of the iron ore mines near the city from which the supply of ore for the furnaces is mainly secured. It is stated that the syndicate has refused the figures offered by the Illinois Steel Co. for its entire output for 1896.

The Tacoma (Wash.) Mill Co. sends the following letter to the Buffalo Forge Co., of Buffalo, under date Jan. 11: "Replying to yours of the 13th of December, answer to which has been deferred by reason of the writer's absence from the city, would say that the lumber dryer which you installed for us some time ago, has so far given very satisfactory results and

we have no complaint to make and could recommend them to any one seeking similar machinery."

That the product of the Westinghouse Electric & Mfg. Co. is of world-wide demand is again demonstrated, the company recently receiving orders to equip an electric railway in the Isle of Man, which has been made famous by Hall Caine, the great novelist. Another order is for electric railway apparatus for the City of Coventry, Eng., and a third order, for electric motors and railway generators for Capetown, South Africa. The company is also about to ship an order for electric railway apparatus to Bangkok, Siam.

Hinkle Furnace, of the Ashland Iron & Steel Co., of Ashland, Wis., eclipsed in 1895 all its previous records of production, turning out 40,631 gross tons of charcoal pig iron in 350 days running time, or an average of over 116 tons per day. This is the largest quantity of charcoal pig iron ever produced by a single stack during a similar period of time in this or any other country. The next best year's work of the furnace was 38,304 tons, made in 1892. Noah W. Gray is manager of the furnace, and L. E. Dunham is assistant manager.—[Bulletin.

The old Roane Iron Co.'s mill at Chattanooga, built in 1864, and once a flourishing institution, may soon be dismantled and the machinery transferred to another city. The plant and site, 32 acres, were recently sold by the Southern Iron & Steel Co. to Thos. Carlin's Sons, of Allegheny, Pa. The new owners will remove it if some steps are not taken to purchase and keep it in the South. It would require not to exceed $50,000 to purchase the entire plant, ground, machinery, buildings, and all. The machinery cost in the neighborhood of $200,000.

A Chicago paper in its report on industrial investments says: "The Consolidated Steel & Wire Co. appears to have enjoyed an unusually prosperous year. While the officials of the company are disinclined to make an official statement of earnings, it is understood that the net earnings for the year were something over $1,000,000. The company paid 10 per cent dividend on its $4,000,000 of capital, leaving $600,000 for the surplus account. If a portion of its surplus went into the purchase of materials while they were cheap, the course of the price of wire nails easily demonstrates that future profits will be larger. There was a statement out that the capital stock would be increased $2,000,000 in the course of the year. This is given for what it is worth."

The Shelby Iron Co., of Shelby, Ala., refers in a circular to test of wheels in which Shelby charcoal car wheel iron was used. Last June a wheel made by the Barney & Smith Car Wheel Co., Dayton, O., was tested in the presence of J. H. Harris, inspector for the Pennsylvania Railroad. It stood 504 blows of a 140 lb. weight falling 12 ft. It was made of Shelby iron and old wheels. In 1875, the Barney & Smith Mfg. Co. made a set of wheels of Shelby iron which were put in passenger service for test as to durability. They ran 70,000 miles, and two of the wheels, now in the possession of the Shelby Iron Co., would probably stand 25,000 miles more.

The Baldwin Locomotive Works have contracted to build 32 additional locomotives to go to Russia. Car-building: 400 freight cars by the South Baltimore Car Works for the West Virginia & Pittsburg; 300 coal cars by the same works for various coal companies; 150 cars by the Elliott Car Works, Gadsden, Ala., for the Chattanooga, Rome & Columbus Road; 100 coal cars at the Great Northern shops, St. Cloud, Minn.; 600 25-ton ore cars by the Michigan-Peninsular Car Co., for the Duluth & Winnipeg. Prospective contracts: 1,000 freight cars for the Lake Shore, 500 double-hopper gondola cars forthe Erie, 150 freight cars for the Cincinnati, New Orleans & Texas Pacific.

John W. Chalfant, John J. Donnell and Alexander Nimick presented in court at Pittsburg last week a statement answering the rule on them for an accounting of their trusteeship of the estate of Nimick & Co., assigned to them in 1891. They say that in addition to paying 20 per cent, they have paid the interest on all claims semi-annually, up to Aug. 1, 1895; that it is impossible to sell the property, as desired, except at a great sacrifice. The delay has been occasioned by the period of depression which the iron business suffered, and from which it has only recently recovered. They have $13,000 on hand to pay claims and will make an accounting, if desired, though they think this expense should be avoided.

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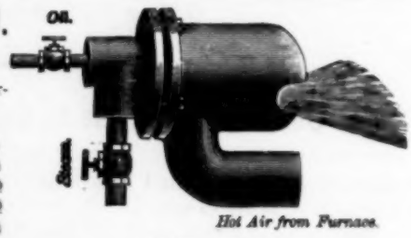

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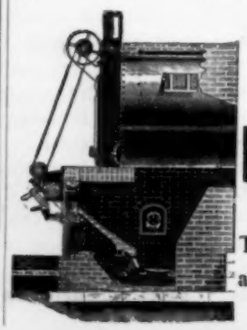

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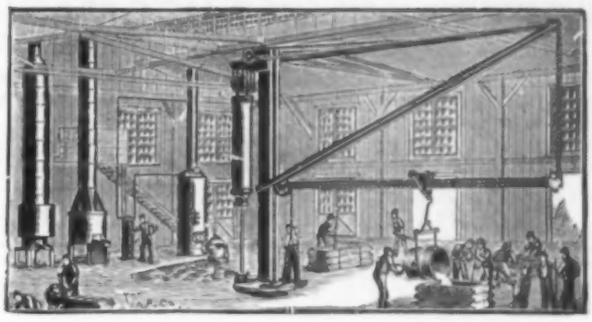

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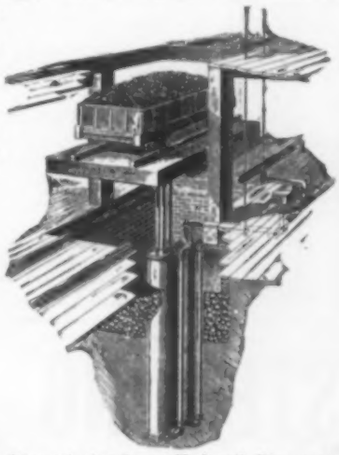

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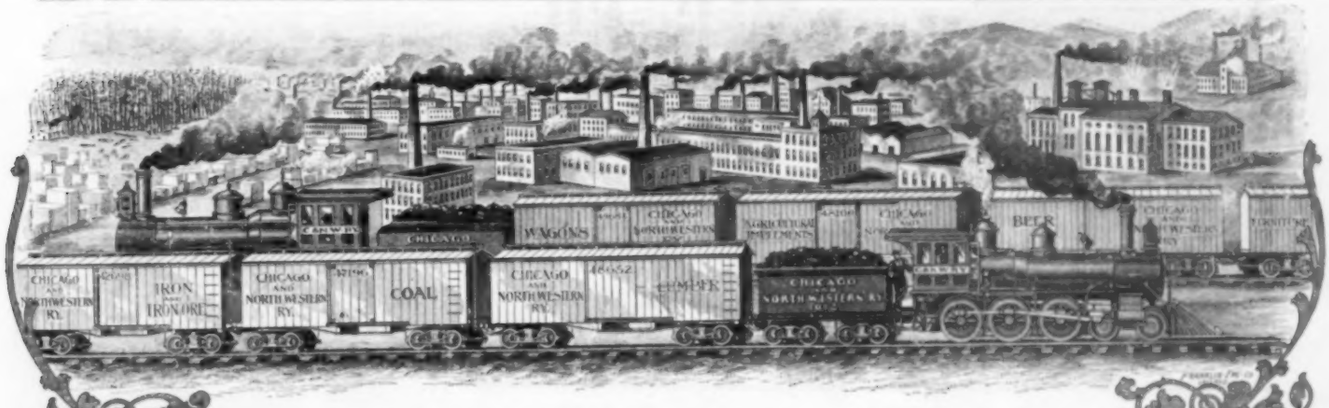

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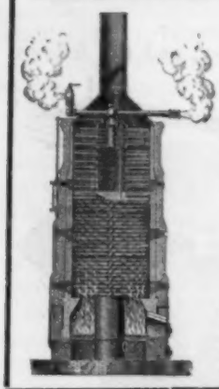

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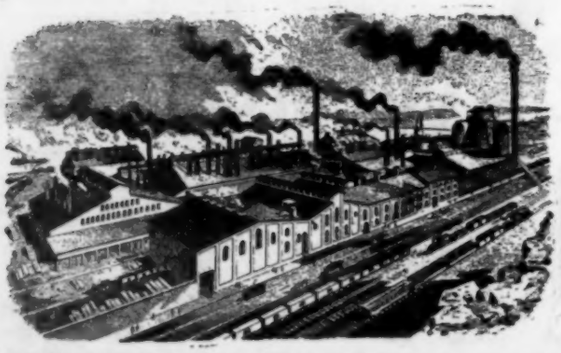

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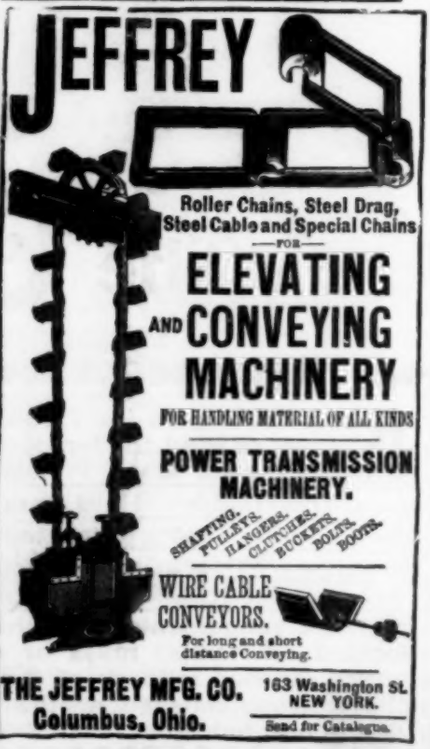

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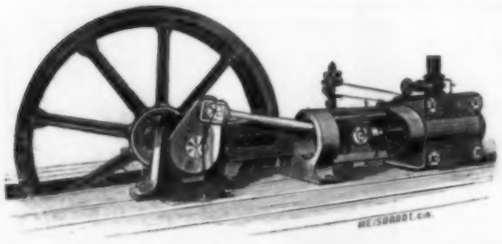

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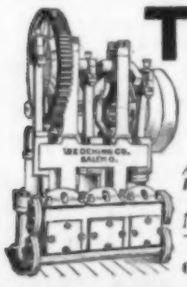

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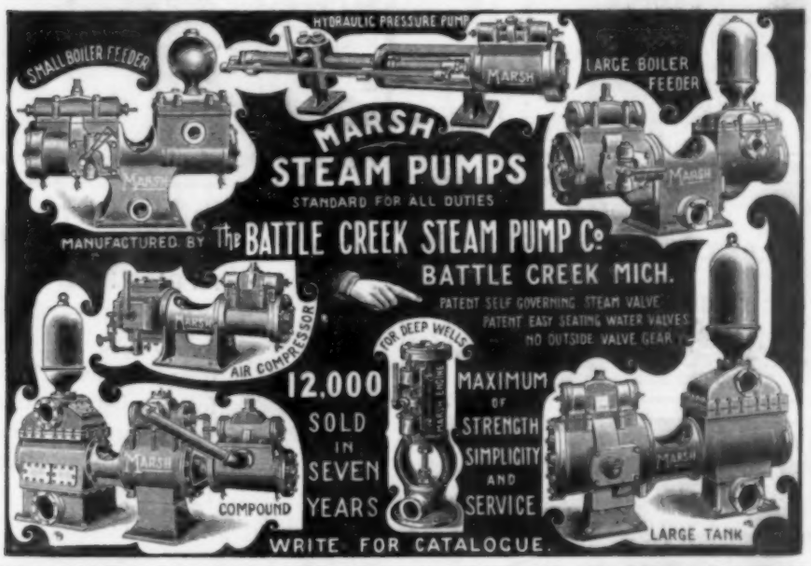

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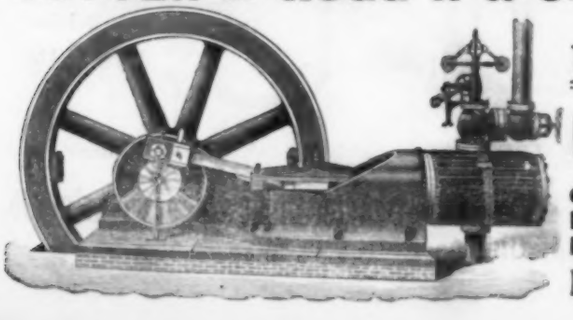

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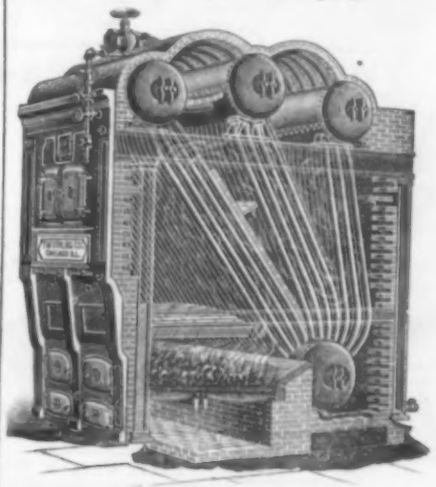

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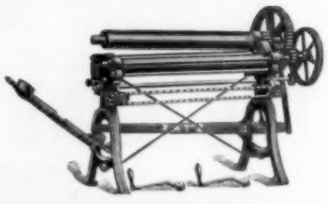

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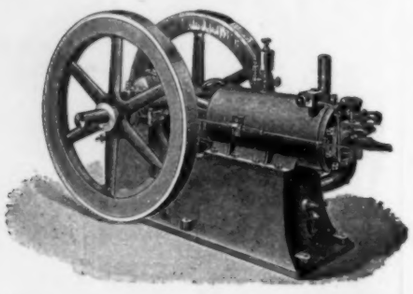

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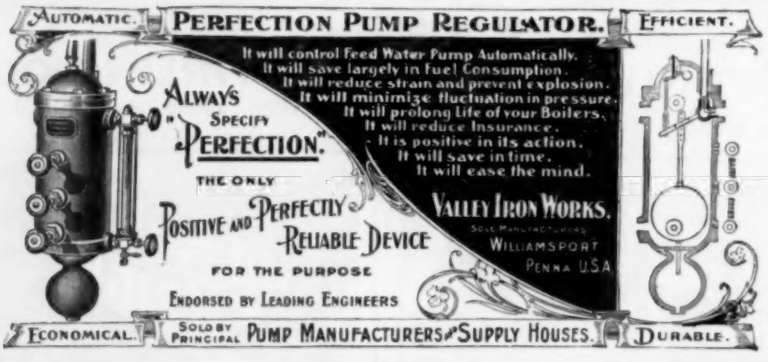
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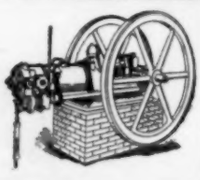

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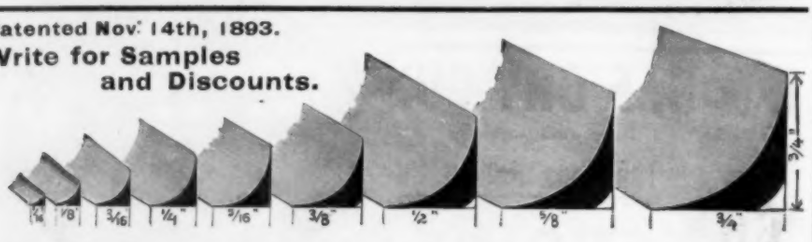

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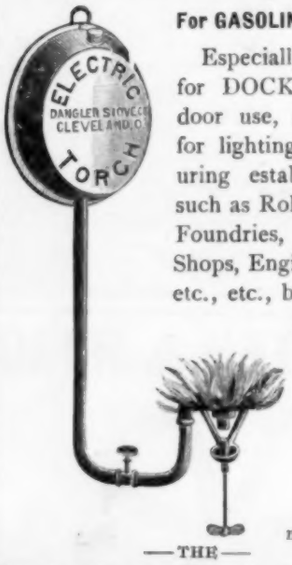

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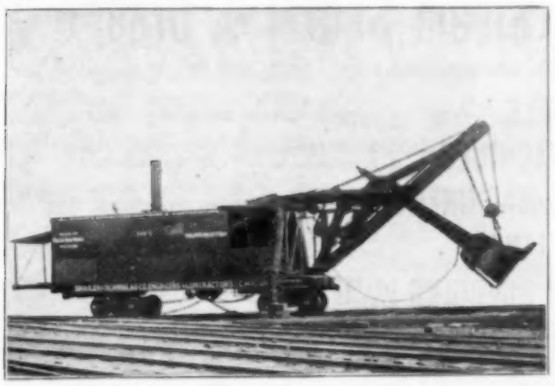

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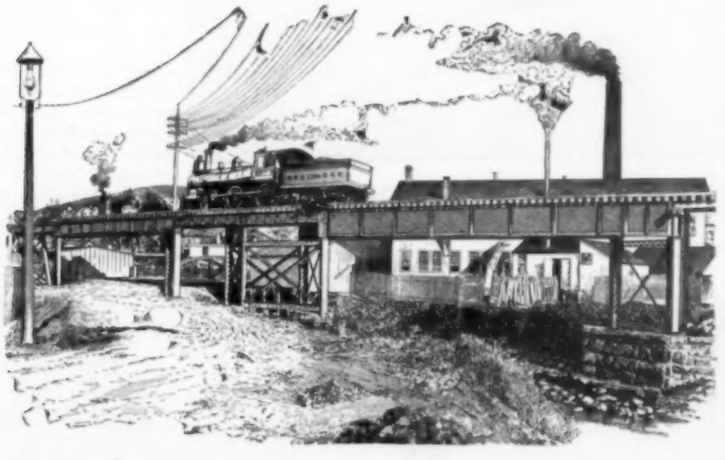

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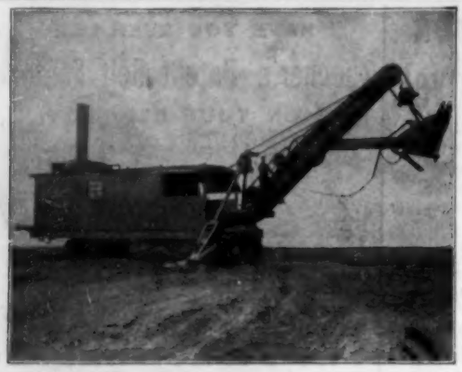

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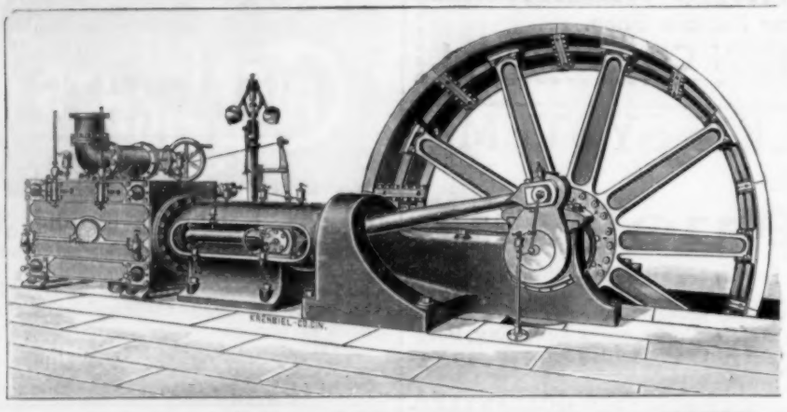

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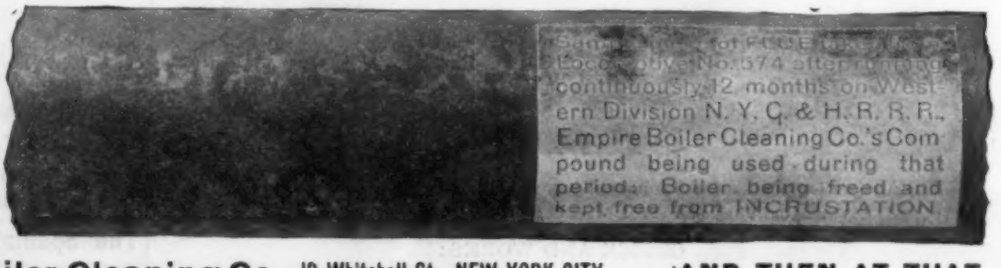
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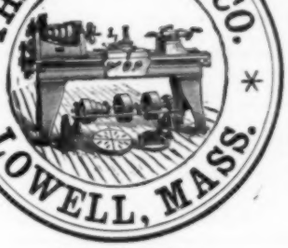

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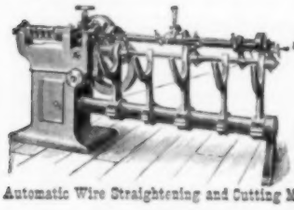

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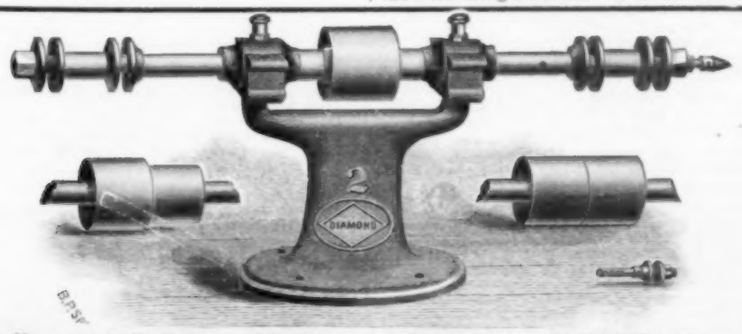

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Bertsch & Co., Cambridge City, Ind.
Lodge & Shipley Machine Tool Co., Cincinnati.
C. H. Haeseler & Co., Philadelphia, Pa.
Springfield Machine Tool Co., Springfield, O.

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Aitchison Perforated Metal Co., Chicago.

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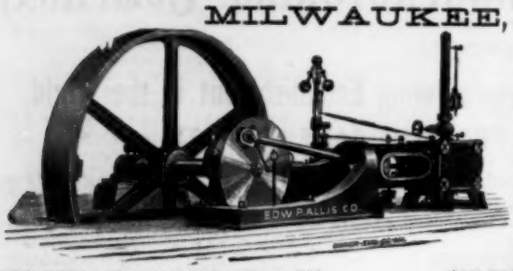

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Hematites No. 1 non-Bessemer	2.25@ 2.75
No 1. Specular, non-Bessemer	2.75@ 3.25

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CLEVELAND (f. o. b. cars):

Bessemer	$13 25
No. 1 Strong Foundry	13 75@ 14 00
No. 2 Strong Foundry	13 00@ 13 25
No. 1 Gray Forge, red short	11 50@ 11 75
No. 2 Gray Forge, neutral	11 00
No. 1 American Scotch	14 00
No. 2 American Scotch	13 50@ 13 75
Lake Superior Charcoal	14 25@ 15 25

PITTSBURG:

No. 1 Foundry	$13 50@ 13 75
No. 2 Foundry	13 00@ 13 25
Gray Forge	11 25@ 11 50
White and Mottled	11 00@ 11 25
Warm Blast Charcoal	15 50@ 16 50
Cold Blast Charcoal	20 00@ 22 00
Bessemer	13 00@ 13 25

CHICAGO (reported by our representative:)

Lake Superior Charcoal	$14 00@$14 50
Local Coke Foundry No. 1	12 75@ 13 25
Local Coke Foundry No. 2	12 25@ 12 75
Local Coke Foundry No. 3	11 75@ 12 25
Local Scotch Foundry No. 1	12 75@ 13 25
Local Scotch Foundry No. 2	12 25@ 12 75
Local Scotch Foundry No. 3	11 75@ 12 25
Southern Coke No. 1	12 60@ 12 85
Southern Coke No. 2	12 35@ 12 60
Southern Coke No. 3	12 10@ 12 35
Southern No. 1 Soft	12 60@ 12 85
Southern No. 2 Soft	12 10@ 12 35
Southern Silveries No. 1	13 35
Southern Silveries No. 2	12 85
Jackson Co. Silveries	14 50@ 16 00
Ohio Silveries No. 1	15 00@ 15 50
Ohio Silveries No. 2	14 50@ 15 00
Ohio Strong Softeners	15 00@ 15 50
Alabama Car Wheel	17 50@ 18 00
Malleable Bessemer	
Coke Bessemer	

CINCINNATI (reported by Rogers, Brown & Co.)

Southern Coke No. 1, Foundry	$11 50@$11 75
Southern Coke No. 2 and No. 1 Soft	11 50@ 11 75
Hanging Rock Coke, No 1	12 50@ 13 50
Hanging Rock Charcoal No. 1, Fdy	16 00@ 17 00
Tennessee Charcoal No 1	13 50@ 14 00
Jackson County Silvery No 1	14 00@ 15 00
Southern Coke, Gray Forge	10 25@ 10 75
" " Mottled	10 00@ 10 50
Standard Alabama Car Wheel	15 75@ 16 25
Tennessee " "	14 50@ 15 00
Lake Superior " "	15 75@ 16 25

BUFFALO (reported by Rogers, Brown & Co.)

No. 1 Foundry Strong Coke Iron Lake Superior Ore	$13 50
No. 2 Foundry Strong Coke Iron Lake Superior Ore	13 00
Ohio Strong Softener No. 1	15 00
Jackson Co. Silvery No. 1	16 25@ 17 00
Lake Superior Charcoal	15 75@ 16 25
Southern Soft No. 1	13 50
Hanging Rock Charcoal	18 50

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Southern Coke No. 2	12 00
Southern Coke No. 3	11 75
Southern Gray Forge	11 25
Southern Charcoal No. 1	14 50@ 15 00
Missouri Charcoal No. 1	14 00@ 15 00
Ohio Softeners	16 20@ 17 00
Lake Superior Car Wheel	17 00@ 17 50
Southern Car Wheel	16 50@ 17 00

OLD RAILS AND SCRAP METAL.

	Gross Tons
Old iron rails	$17 00
Old steel rails	12 50
Old car wheels	13 00
	Net Tons
No. 1 R. R. wrought scrap	$12 00
Mill scrap	9 50
No. 1 Machine cast scrap	10 00
Iron axles	16 00
Axle turnings	9 00
Wrought turnings (free from cast)	8 50
Cast borings	7 50
Uncut wrought iron boilers	5 00
Steel boiler plates	10 00
Grate bars	6 50
Pipes and flues (clean)	8 50
Tank iron	9 00
Hoop and band iron	7 00
Sheet iron	6 50
Wrought drillings	7 50
Malleable iron	9 00

STRUCTURAL MATERIAL.

Beams and Channels (Cleveland mill)	1.49c@1.54c
Angles	1.34c@1.39c
Tees	1.49c
Universal Plates	1.45c
Sheared Plates	1.55c

MERCHANT IRON AND STEEL.

[List prices out of store.]

Flat Bar.

1½ to 4 by ⅜ to 1 inch	1
4½ to 6 by ⅜ to 1 inch	1
1½ to 6 by 1⅛ to 2 inch	1 65
1¼ & 1⅜ by ⅜ to ¾ inch	1 40
1 & 1⅛ by ⅜ to ¾ inch	1 50
⅝, ¾, ⅞, by ⅜ to ⅞ inch	1 60

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FURNISHED both Dry and Ground in Oil

USED BY NEARLY ALL THE RAILROADS.

Round and Square.

1 to 1⅜ inch	1 40
2 to 2¾ inch	1 60
2⅞ to 3¼ inch	1 55
3⅜ to 4 inch	1 90
4⅛ to 4⅝ inch	2 50
4⅞ to 5 inch	2 70

Oval.

⅜ to 1¼ inch	1 60
⅝ to ¾ inch	1 60
⅛	1 80
⅞	2 00

Half Oval and Half Round.

1⅛ to 3 inch	1 95
⅜ to 1⅛ inch	1 75
⅝ to ¾ inch	2 00
⅛	2 15
⅞	3 25

Heavy Band.

1¼ to 6 by ¼ and 5-16 inch	1 50
1 to 1⅜ by ¼ and 5-16 inch	1 55
⅜ to ⅝ by ¼ and 5-16 inch	1 65
½ to ⅝ by ¼ and 5-16 inch	1 90

Hoop Iron.

1 7-16 to 4, No. 13, 14, 15 and 16	1 75
1 7-16 to 2, No. 17, 18 and 19	1 80
1 7-16 to 2, No. 20	1 90
1 7-16 to 2, No. 21	2 00
1 7-16 to 2, No. 22	2 10
1⅛ to 1⅜, No. 13, 14 and 15	1 80
1⅛ to 1⅜, No. 16, 17 and 18	1 85
1⅛ to 1⅜, No 19 and 20	1 90
1⅛ to 1⅜, No. 21	2 00
1⅛ to 1⅜, No. 22	2 10
15-16 and 1 inch, No. 13, 14 and 15	1 75
15-16 and 1 inch, No. 16, 17 and 18	1 90
15-16 and 1 inch, No. 19 and 20	2 00
15-16 and 1 inch, No. 21	2 10
15-16 and 1 inch, No. 22	2 20
⅝, No. 13, 14 and 15	2 00
⅝, No. 16, 17 and 18	2 10
⅝, No. 19 and 20	2 20
⅝, No. 21	2 30
⅝, No. 22	2 40
13-16, No. 13, 14 and 15	2 10
13-16, No. 16, 17 and 18	2 20
13-16, No. 19 and 20	2 30
13-16, No. 21	2 40
13-16, No. 22	2 50
¾, No. 13, 14 and 15	2 20
¾, No. 16, 17 and 18	2 35
¾, No. 19 and 20	2 45
¾, No. 21	2 55
¾, No. 22	2 65
11-16, No. 13, 14 and 15	2 45
11-16, No. 16, 17 and 18	2 50
11-16, No. 19 and 20	2 60
11-16, No. 21	2 70
11-16, No. 22	2 80
11-16, No. 23	2 90
⅞, No. 13, and 15	2 50
⅞, No. 16, 17 and 18	2 60
⅞, No. 19 and 20	2 70
⅞, No. 21	2 80
⅞, No. 22	2 90
⅞, No. 23	3 00
9-16, No. 13, 14 and 15	2 70
9-16, No. 16, 17 and 18	2 80
9-16, No. and 20	2 90
9-16, No. and	2 98
9-16, No. 221	3 10
9-16, No. 22	3 20
7-16 and ½ inch, No. 13, 14 and 15	2 90
7-16 and ½ inch, No. 16, 17 and 18	3 00
7-16 and ½ inch, No. 19 and 20	3 10
7-16 and ½ inch, No. 21	3 20
7-16 and ½ inch, No. 22	3 30
7-16 and ½ inch, No. 23	3 40
⅜, No. 13, 14 and 15	3 40
⅜, No. 16, 17 and 18	3 50
⅜, No. 19 and 20	3 60
⅜, No. 21	4 90
⅜, No. 22	4 00
⅜, No. 23	4 15

Light Band.

1½ to 6 by ⅛ to 3-16 inch	1 60
1¼ to 6 by Nos. 11 and 12	1 65
1 to 1⅜ by ⅛ to 3-16 inch	1 65
1 to 1⅜ by Nos. 11 and 12	1 70
⅞ and 13-16 by ⅛ to 3-16 inch	1 80
⅞ and 13-16 by Nos. 11 and 12	1 75
¾ and 11-16 by ⅛ to 3-16 inch	1 90
¾ and 11-16 by Nos. 11 and 12	1 95
⅝ and 9-16 by ⅛ to 3-16 inch	2 05
⅝ and 9-16 by Nos. 11 and 12	2 10
½ by ⅛ to 3-16 inch	2 20
½ by Nos. 11 and 12	2 25

Wagon Box Iron.

⅝ inch, beveled edge, by Nos. 11 and 12	1 80
⅝ inch, " " " " 13 and 14	1 90
¾ inch, " " " " 11 and 12	1 95
¾ inch, " " " " 13 and 14	1 35

Sheet Iron.

No. 10	1 60
No. 12	1 70
No. 14	1 80
No. 15-17	1 90
No. 18	2 05
No. 20	2 20
No. 22-24	2 30
No. 25-26	2 40
No. 27	2 50

Steel Boiler Plates—1-4 in. and Heavier.

Tank	1 45
Shell	1 60
Flange	1 70
Marine Flange	2 00
Fire Box	2 50

Above includes plates 90 inches wide.

90 to 96 in. wide	⅛c. lb. extra
96 to 100 in. wide	1 c. "
100 to 104 in. wide	1⅛c. "
104 to 106 in. wide	special

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. lbs.
1 to 2 in. inclusive	08
9-16 to ⅞ in. "	08

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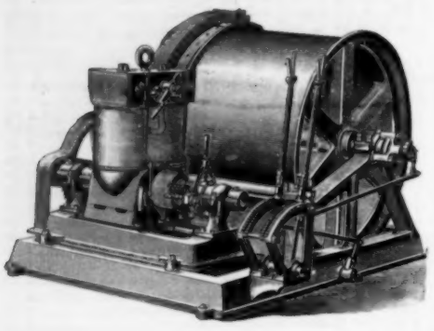

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⅜ to 11-16 and 4½	.10
½ to 6 in.	.10½
⅝ to 9-32 and 6⅝ to 7 in.	.11
7 in	.13

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2 to 9-16 in. wide by 2 to ⅜ thick	.8

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Bessemer Machinery	base price,	1 50
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Jessop's	15½c
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Munson's Short Lap Single Leather	dis 50
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" 2 Jaw Brass Workers	dis 30
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Wescott's Scroll Combination	dis 33⅓
" Independent	dis 40
" Little Giant Drill	dis
Horton's Universal	dis
" Independent	dis 45
Whiton's Independent	dis 45
National Combination	dis 40
Sweetland "	dis 40
Almond Drill	dis 20
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Skinner's Combination Lathe	dis 40&10
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" Universal Lathe	dis 40&10
" Drill	dis 20

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Pratt & Whitney	dis 10@15
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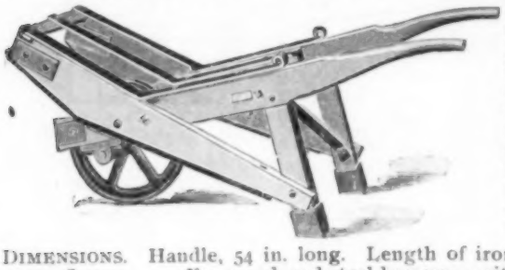

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Pittsburgh, Bellaire and East	†12:45 pm	† 6:25 pm
Philadelphia and New York	* 1:40 pm	*11:25 am
Baltimore and Washington	* 1:40 pm	*11:25 am
Alliance and Pittsburgh	* 1:40 pm	*11:25 am
Ravenna and Alliance	* 5:00 pm	* 8:30 am
Philadelphia and New York	*11:10 pm	* 5:25 am
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Northampton ..... dis 55
Crystal ..... dis 65@70
Vitrified ..... dis 60@70
Vulcanite ..... dis 60&10
Hamden ..... dis 60&10@70
Cyclone ..... dis 60@60&10

Files.

Arcade ..... dis 60&10@60&10&10
Nicholson ..... dis 60&10@60&10&10
" X. F. ..... dis 25
Kearney & Foot ..... dis 60&10@60&10&10
Black Diamond ..... dis 60&10@60&10&10
McClellan ..... dis 60&10@60&10&10
Disston's ..... dis 65@70
Western ..... dis 70
Stub's ..... dis 25
Grobet's ..... dis 30
Reynolds Bros.' Hand Cut ..... dis 50
Industry File Works Hand Cut ..... dis 50

Hammers.

P. S. W ..... dis 40
Atha new list, Jan. 15, 1887 ..... dis 50
Heavy hammers and sledges under 5 lbs 12c
" " " " over 5 lbs 10c

Jack Screws.

Illinois Bolt Co. list ..... dis 75

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5½	4¾	4	3½	3⅛
Hexagon	15⅛	11⅜	8½	6	5⅛	5¼	
Washers	9	8	7	5	4⅛	4½	4⅛

In lots less than 100 lbs, ½ lb add ½c., 1 lb boxes add 1c to list.

Nails (wire).

List July 14, 1887 ..... dis 85
Standard Penny Nails, ½ keg card rate
Car lots $2.25
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Oilers.

Zinc and Tin ..... dis 60
Brass and Copper ..... dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ½ doz ..... dis 10@10&10

Picks.

Railroads, 5 to 6 lbs ..... $12 dis 60
" 6 to 7 lbs ..... $13 dis 60

Pulleys.

Iron Pulleys, Walker List ..... dis 50
Medart Pulleys ..... dis 50
Split Wood Pulleys ..... dis 55@60

Pulley Blocks.

Moore's Anti-Friction Differential Chain Pulley Block ..... dis 20

Rivets.

Iron, Thousand, list November 1, 1894 ..... dis 60@65
Iron, Ordinary, Cooper's Block and Carriage list November 1, 1894 ..... dis 60@65
Copper ..... dis 50@50&10

Taps.

Cards, Hand and Nut to 2 in ..... is 50
Carpenters' " " " ..... dis 50
Morse " " " ..... dis 50
Pratt & Whitney " " new list ..... dis 10
Machine Screw Taps ..... dis 55
Pipe Taps to 2½ in ..... dis 70
Stay Bolt Taps ..... dis 25
Stove Bolt Taps ..... dis 55
Pulley Taps ..... dis 40

Vises.

Solid Box ..... dis 60
Parker's ..... dis 20@25
Prentiss ..... dis 20
Stephen's ..... dis 25@30
Barrett's ..... dis 30
Miller's Falls ..... dis 40
Merrill's ..... dis 15@20
Howard ..... dis 35

Wire.

New List, Apr. 9, 1894

Brass ..... dis 4c
Copper ..... dis 4c
Bright and annealed, Nos. 0 @ 18 ..... dis 70&10@75
" " Nos. 19@26 ..... dis 75@75&5
" " Nos. 27@36 ..... dis 75&10&5
Coppered Nos. 0 to 18, market list ..... dis 70@70&5
Galvanized Nos. 0 to 18 " " ..... dis65&5
Tinned market Nos. 0 to 18 ..... dis 67½
Cast steel ..... dis 50
Tinned Broom Wire ..... dis 70&5@70&10
Annealed Fence, Nos. 8 and 9 ..... dis 75
Annealed Grape, Nos. 10 to 14 ..... dis 75
Stub's Steel Wire regular ..... 95c ½ lb dis 30

Wrenches.

Coe's genuine ..... dis 50
Girard Standard ..... dis 70&10
Agricultural ..... dis 75&10
Mechanic's ..... dis 55&10&5
Bemis & Call's Combination ..... dis 35
Donohue's Engineers ..... dis 20&10
Lamson & Sessions Engineers ..... dis 60
Billings & Spencer's Drop Forged ..... dis 25
William's " " ..... dis 25
Alligator " " ..... dis 40

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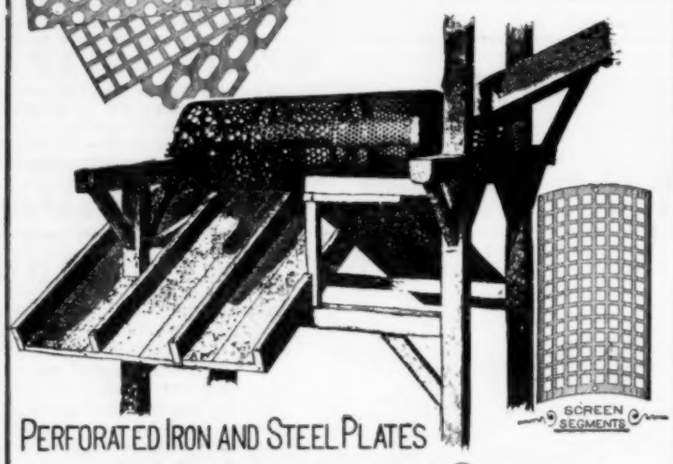

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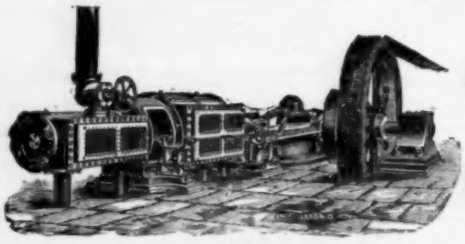

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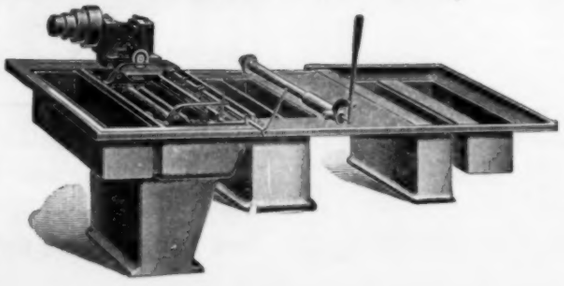

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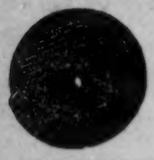

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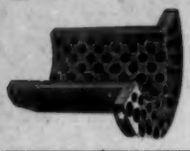

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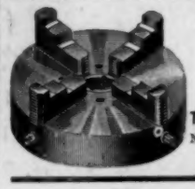

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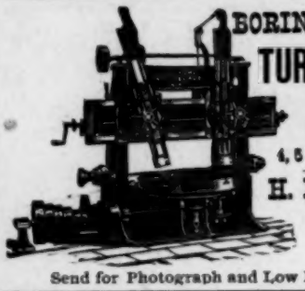

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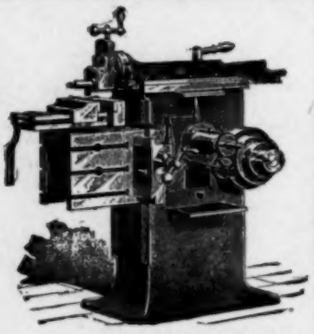

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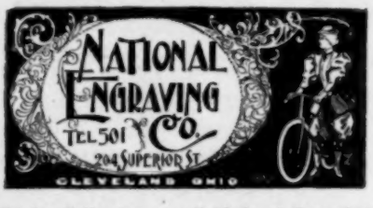

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